JUL 2 1879

THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XXX.—No. 8. Whole No. 476. | NEW YORK, WEDNESDAY, APRIL 16, 1879. | $3 PER ANNUM IN ADVANCE.

A. M. CALLENDER & CO., Proprietors.
G. WARREN DRESSER, C.E., Editor.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European Countries, $3 50 (15 shillings—18 francs). All payments to be made in advance. Single copies, 15 cents.

Remittances should be made either by post-office order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

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[OFFICIAL NOTICE.]

OFFICE OF SECRETARY WESTERN GAS ENGINEERS AND SUPERINTENDENTS' ASSOCIATION, LOUISIANA, MO., March 25, 1879.

The Annual Meeting of the above Association will be held at the Tremont House, in Chicago, on Wednesday, May 14th, 1879, at 10 o'clock, A. M.

LEE A. HALL, Secretary.

REDUCTION IN PRICES OF GAS.—The Boston Gas Light Company reduced the price of gas to all consumers, on April first, to $2 per thousand feet. Lowell enjoys the luxury of gas light at $1·80

Cleveland, Ohio, is supplied at $2 per thousand to private consumers, and $1·25 to the public lights and buildings.

At these prices, certainly, people ought to turn on the gas and burn it freely-

EXTENDING THE USE OF GAS.

It is with great pleasure that we are able to chronicle an event that, in this vicinity at least, marks a new departure in the conduct of the gas business.

During the past two weeks there has been given in the city of Brooklyn a course of lectures upon the proper method of preparing food for family use, or, in other words, proper cooking. For seveaal years there has been much attention paid to this subject in London ; and schools have been established in connection with the Kensington Museum, for the purpose of instructing classes in this most important branch of domestic economy, and many of those graduating from these classes devote themselves to teaching. One of these graduates, Miss M. S. Dod, arrived in New York last winter, and delivered several courses of lectures to very large classes composed of ladies and misses. The aptness for teaching, the thorough attention to every detail, the neatness, and the successful result, exemplified in the various dishes which were prepared and cooked before the classes, rendered the whole matter very interesting as well as instructive ; since then similar lessons have been given in Philadelphia, with great success. But the point to which we would particularly draw attention is that, in every case, *all* the cooking was done with GAS fuel—Miss Dod being well aware that much better results can be obtained by the use of gas than by any other fuel.

In view of these facts, the managers of the various gas companies in the City of Brooklyn united in an arrangement to secure the services of Miss Dod for a series of *free* public lectures in that city. These have been eminently successful, being well attended, replete with interest, and, at the same time, giving to many people, who would not otherwise be reached, a knowledge of the practical advantages of gas for domestic purposes other than those of illumination.

The result is a very large enquiry for information as to the use of gas stoves for cooking. Among other lectures delivered there were three given before the young ladies of Packer Institute, about seven hundred in number ; and we venture to assert that the benefits resulting from this instruction, to future households, will be equal to those derived from the study of all the "ologies" on the list of studies of that institution.

This movement, on the part of the gas companies, is an eminently proper one. The time is, we believe, near at hand when the *sale* of gas will of necessity be reduced to business principles. The manufacture is daily becoming reduced more and more to a scientific procedure ; but this is not enough. The sale is a commercial affair, and those responsible for this part must adopt exactly the same course as any other manufacturing corporation, viz. : take such measures as will secure the largest possible amount of sales. In times past it may have answered to sit up in the dignity and grandeur which is due to so important a branch of manufacture and trade, and quietly wait for customers to solicit the privilege of being served ; but methods have changed in transacting all kinds of business, and the spirit of the present age can best be met by *taking the lead*, and not by standing back. A man who would be successful in trade to-day makes known the fact, in every legitimate way, that he has something to sell, takes care to instruct the purchaser in the proper use of his commodity, seeks business, and when he gets it takes all reasonable care to keep it. If any gas manager doubts this, let him investigate the single item of the sale of kerosene oil and lamps in his own district. The first and prime necessity to manage business on this plan, is to place the whole establishment, plant, employees, and capital on an honest, fair working basis ; be contented with a fa r manufacturer's profit, and then go for the business. We would call atten-

tion to the admirable address of Mr. John West, of Maidstone, in another column, upon this very point.

He speaks from long experience, and practical knowledge. Many companies may greatly improve their results, by a judicious attention to the gas fitting business, whether carried on by themselves or not. A few practical hints and instructions to gasfitters would surely bear good fruit, and their agency could be easily made available, in greatly extending consumption, if they were kept properly posted as to the best appliances for using gas.

Progress of the Electric Light.

Our article on this subject has been decreasing in length, and perhaps also in interest, for some time past, but the fault is not ours. Paucity of news in this direction has been the sole cause of the degeneracy, and we feel sure that the day is not far distant when we shall have no more progress to report. We have always predicted, even during the height of success, the death of electric lighting, and our prophecy is not far short of becoming verified. Although not actually dead it is slowly dying; it is even now in its last struggles, and has retired from active public life some time since. Professor Edison stepped in at one time and administered a cordial, but its effect only lasted for a time, and when it wore off the weakness was greater than before. Quack medicine was not what was wanted, but it was what was administered, and the sequence can hardly surprise even the would-be electrical physician. Gas light treated electricity contemptuously, and awaited time and opportunity, which were not long in presenting themselves, to show the public the superiority which a useful invention has over a philosophical toy. Notwithstanding the want of success, or we might say decided failure, which has met the attempts at introducing electric lighting, some scientists are still devoting considerable attention to its improvement, especially those who have interests at stake. Dr. Siemens has been evolving a new regulator, and he read a descriptive paper on its construction and use before the Physical Society at a recent meeting.

The prime element of success in the subdivision of a current is that each branch shall be of uniform intensity. Dr. Siemens proposes to overcome this difficulty by passing the current through a fine steel wire 1-20 M.M. thick. Suspended over this strip is a fine spindle held by an insulated support, and so arranged that it sinks or rises according to the bending of the wire. On the top of the spindle is a small metallic plate, which, as the apparatus changes position, causes contact with springs set radially around. By the contact being made and broken, resistance coils are taken in or thrown out of circuit as the case may be. The instrument is extremely sensitive, a rise of one degree F. being sufficient to throw two or three of these coils in circuit. The action of course follows the well-known law that the temperature varies as the square of the current, and this of course increases its sensibility.

Some of Mr. Edison's results were disputed by the Doctor, and we do not wonder at this, as the electrical mysteries which have lately been brought forth in America could never breathe in British atmosphere.

The experiment which are being carried out at the National Museum are far from giving satisfactory results; but the authorities do not seem inclined to admit this fact. In the meantime the experiments are to be suspended until next winter—a convenient way of shelving a disagreeable subject.—*Journal of Artificial Light and Sanitary Gazette.*

The Present Status of the Metric System.

From a statistical table recently constructed by M. D. Malarce, and published in *Comptes Rendus*, it appears (1) that the decimal metric system of weights and measures is now established legally and obligatory in 18 States, comprising a population of 236.6 millions of inhabitants (these States are France and colonies, Belgium, Holland and colonies, Germany, Sweden, Norway, Austria-Hungary, Italy, Spain, Portugal, Roumania, Greece, Brazil, Columbia, Ecuador, Peru, Chili, and the Argentine Republic); (2) that it is made legally optional in three States, having a population of 75.6 millions, viz., England, Canada, and the United States; (3) that it is admitted in principle, or partially for customs, in five States, with 343.6 millions of inhabitants, viz., British India, Russia, Turkey, Venezuela, and Hungary; (4) and that, altogether, the system is established obligatory, or optionally, or in principle, in 26 States, comprising 655 million inhabitats. Four States have different systems, decimal as to multiples and divisions, but based on another unit than the meter. They comprise 471 million inhabitants, and are Switzerland, Mexico, Japan, and China. To these may be added some mediocre States, with various systems, non-decimal and non-metric. It appears, then, that in 1878 more than half the population of civilized States, comprising 1,180,000,000 inhabitants, legally recognize the decimal metric system of weights and measures. A large part of this progress has been made in recent years.

North British Association of Gas Managers.

Mr. D. Bruce Peebles (Edinburgh) read the following paper on

GOVERNORS FOR PUBLIC LAMPS AND STAIR-LIGHTS.

If we visit the seat of any of our manufacturing industries, and have the privilege of seeing the machinery employed, and watching the various processes connected with almost any kind of business, we can scarcely fail to note the extraordinary economy which pervades a well-conducted establishment. Indeed, it is now seldom that we see success attend the efforts even of the cleverest, if economy be lost sight of. The truth of the proverb, "A penny saved is a penny gained," is exemplified in every direction in which we turn, and the stimulating effect of honest competition is noticeable as being of all things the best for inducing economical efforts, and leading us to gather up the fragments, so that nothing may be lost.

In gas manufacture, economy may be said to present itself in three different forms—first, in getting the greatest yield of gas out of a ton of coal with a minimum of working expenses; secondly, in utilizing all the bye-products, so that as much as possible may be made out of them; and, thirdly, in the using of the manufactured article in the best and most economical manner.

Under the first head may be included the mechanical stoker of Mr. Foulis, the Aitken and Young process, Mr. Hislop's new process for regenerating spent lime, and, generally, every mechanical and chemical improvement tending to cheapen the manufacture.

Under the second head may be classed those scientific discoveries from which spring the application to industrial uses, of the residual products of the distillation of coal, such as naphtha, benzole, sulphate of ammonia, aniline dies, etc., and as a notable instance of the rise in value of residual products from these causes, I may, in passing, call your attention to what appeared only lately in the pages of the *Journal of Gas Lighting*, in reference to Bradford. Between seven and eight years ago the old Bradford Gas Company agreed, by contract, to sell the whole of their ammoniacal liquor for £800 a year. A short time ago the contract expired, and instead of £800 the corporation was offered £10,600 a year for it.

Under the third head we may class improvements in the distributory apparatus, such as gasholders, valves, pipes, fittings of all kinds, governors, burners, reflectors, and every appliance by which the gas may be distributed and consumed with the greatest economy. In connection with this part of the subject, the general public is equally interested with the gas engineer, because not only economy, but health, has to be considered, as we all know that gas which is not properly consumed is not only wasted, but vitiates the atmosphere, and renders our dwellings unhealthy.

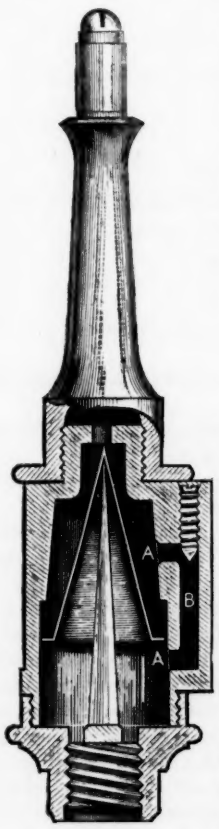
Gas managers are now looking into this branch of the subject much more than they used to do, and the popular lectures which are frequently given by them show that they are really anxious to let the public know the best methods of consuming gas, that it is not pleasant for them to make a good article and see it wasted, even though they be paid for it, and that gas economy should not be considered by them only within the gates of the gas works, but should have their attention from retort to burner. It will be a good thing for the public when the supervision of the gas manager is extended to the internal fittings, on to and including the burner. That this will come, I have no doubt, and then the "gas-burner man," whom we all know so well, will vanish from the scene, and bad fittings and jumping lights will no more be known.

It cannot be doubted that there is an enormous annual waste from leakage, bad burners, and excessive pressure, and it is to this part of the subject of gas economy—viz., the controlling of pressure—that I have been applying myself for a number of years past.

From the circumstance that I have long been largely engaged in the manufacture of gas governors, including those for public lamps, in which, of course, the governor is required for controlling the consumption of gas at a single burner only, I often have been asked by friends if I could not make some reliable and yet simple lamp governor, in the construction and use of which leather and liquid could be dispensed with; and, after many experiments, I believe I have succeeded in doing so. To-day I have the privilege of showing you the result of my labors in that direction, and you will observe from the drawing that the lamp governor I now bring before you is of the simplest construction.

It consists of a hollow flanged cone, resting on a needle-pointed stud, and working in a cylinder to which the flange of the cone is accurately fitted. The needle point is set exactly under the valve seat, and keeps the apex of the cone always in position, so that the valve cannot, by any means, get out of its proper place; while, at the same time, the greatest freedom of action is allowed to the cone. The simplicity of the apparatus is such that there seems to be scarcely a possibility of it getting out of order, and the

only bad thing about it, from a manufacturer's point of view, is that it will last for ever. You will observe from the drawing that there are two lateral openings, A A, in the case, one below and another above the flange of the cone. These are connected by a vertical passage, B, and it is through this passage that the gas is supplied to the burner when a varying consumption is required, either for lamps, or for stoves, or gas fires—the apparatus is made larger when applied to the latter. A small conical-pointed screw is used to open or close the top lateral passage, the use of this screw being to vary or adjust the quantity of gas delivered at the burner. By simply turning the screw, any modification in the size of the flame or flow of gas can be readily obtained. When the size of flame and flow of gas are required to be constant, as in public lamps, the best and simplest arrangement is to dispense with these passages, and pierce a small hole, C, in the hollow cone. The size of the hole regulates the flow of gas, which, once being adjusted, a constant and unvarying discharge may be depended on.



The action of the instrument is as follows:—As soon as the stopcock is opened, the gas fills the interior of the cone, and momentarily closes the valve; but, finding its way by the vertical passage, or through the hole, C, in the cone, it reaches the chamber above the cone. The cone is, therefore, now surrounded by gas of the same pressure, and, having nothing to support it, falls, and lets gas pass to the burner. But this only takes place to an extent that allows a difierential pressure to be established, sufficient to support the cone, which is then equilibriated between two pressures, and the difference between these two pressures remains constant, however much the initial pressure of the gas may vary, unless, of course, it gets so low as not to be able to raise the cone. It follows, therefore, that a constant flow of gas will be maintained under varying pressures, and, although larger burners be used, no more gas will be allowed to pass than what the governor has been adjusted to deliver. Whenever the initial pressure of the gas is increased, there will be a greater difference of pressure between the gas below the cone and that above it, and the cone will at once rise until the equilibrium is again established. Should the initial pressure be decreased, there will be less pressure below the cone, which will at once fall, and again restore the equilibrium, so that the valve is opened by a decrease and closed by an increase of the initial pressure, by this action establishing a constant flow of gas under every change of the initial pressure, and that notwithstanding the size of the burner be changed.

It must be understood that when a larger burner is employed the pressure at the point of ignition is diminished, and vice versa, so that to get the best results a burner of a size suitable to give the desired pressure should be used, or the regulating screw or hole adjusted to suit any particular burner which may be wished. But with burners obtained from any good maker there will be no perceptible difference of the size of the flame, and no difference at all in the consumption, although the burners be changed, if the same number of burner be put in, which is not the case when the ordinary leather diaphragm governor is used. It is this peculiarity which forms the characteristic difference between this class of governor and the well-known flexible diaphragm governor, which I have so long manufactured. With the leather diaphragm governor, a constant pressure is maintained, with a varying volume or discharge if the burner be changed. With this new governor a constant volume or discharge is maintained, with a varying pressure if the size of the burner be changed. This makes it especially valuable to gas companies who supply gas to public lamps and stair-lights, at a fixed charge. Both are liable to be tampered with, either by putting on larger burners, or by widening the holes of burners which may be so securely fixed that they cannot be taken out readily.

I may here explain, in regard to stair-lights, that our English friends will scarcely appreciate the meaning of such a term, and in case the remarks now made may not be understood by those south of the Tweed, I may simply state what you all so well know—that "stair-lights" are peculiar to the Scotch system of building dwelling houses in flats, now being introduced into some districts of London, and the "stair-lights" are for the general benefit of the in-dwellers of each tenement, the gas used being paid for by them collectively. No meter being used, there is every inducement to burn the gas longer than the hours stipulated for in the contract with the gas company, and also to put on larger burners than those upon which the contract for lighting is based.

It now remains for me to put the governor in action, and show you that it does all I have said it can do; and by contrasting it with one of my ordinary lamp governors, you will be able at once to see the difierence of their behavior, when tried under the same conditions.

You will notice that when I subject the ordinary governor to different initial pressures, the flame keeps steady and without variation. The gas is consumed at a certain pressure, which does not vary, whatever variations of pressure may take place in the main supply pipe; but if I take out the burner, and put in one of a larger size, we at once get a much larger flame, but still burning at the same pressure as before.

If I now take one of the new governors, and subject it to the same test, we observe that the flame remains constant, with every variation of the initial pressure, the same as with the ordinary governor; but if I put in a larger burner we do not get a larger flame, as in the former case, but we get exactly the same volume of gas issuing at a lower pressure.

There is nothing new in the principle of this instrument. It was discovered long ago by Leslie, and, independently, I believe, afterwards by Giroud. Since then there have been many varieties of this kind of governor manufactured, but none have been so successful as Giroud's Glycenrine Rheometer, which most of you have, no doubt, seen and tested.

It would have afforded me much pleasure to have given an account of a few of the best of these inventions, and to have explained them by the help of drawings; but, as I had no intention of being here to-day as a speaker, until I lately heard from our respected Secretary that he was much in want of papers, so little time was left at my disposal that I had to abandon the idea.

I hope, however, at some future time to go more fully into the subject, and to show also some further improvements in station and district governors.

DISCUSSION.

Mr. Hislop—We are frequently startled at the announcement of inventions which promise to revolutionize the whole system of artificial illumination, but we fail to realize them; we have merely the announcement that some great thing has been discovered. Here, however, we have an instrument for the regulation of gas pressure, which, I am bound to say, will revolutionize our system of public lighting. This instrument I have carefully submitted to the most severe tests that I could conceive, both as to the quantity of gas and pressure, and I could find no appreciable variation. Engineers have long expressed the desire to have an instrument that would give the same quantity of gas with different sizes of burners. To attain this has hitherto been the great difficulty. My experience of Mr. Peebles' governors has been that, while they are sent out at the beginning of the year all properly adjusted, accidents happen to the burners; the lamplighter takes them out, and for them substitutes others, and we generally find that those which have been substituted are not in favor of corporations; then, besides, the oil from the diaphragm gets down upon the valve, interferes with the action, and the mechanism thus becomes choked. This new governor seems to meet all requirements for public lighting. No longer will the surreptitious user of gas be enabled to get an increased quantity for the money he is paying; and if he substitutes a larger burner than that provided, he will perhaps have a slightly diminished quantity instead of the quantity he might expect. In this instrument we see the work of a philosophic mind and true mechanician. The instrument is unique in itself, of very small bulk, and altogether beautiful. It will, I have no doubt, meet all the requirements of those who use gas light, and it will obviate the use of meters in the future. The instrument is "a thing of beauty," and I believe it will be "a joy forever."

Mr. M'Gilchrist—The paper which we have just listened to by Mr. Peebles is, like all his former productions, very concise, and characterized by great ability. I may state that Mr. Peebles sent me one of his governors some time ago, with a view of testing its qualities, and giving the results of these tests to this meeting. I had the pleasure of a visit from Mr. Young, of Clippens, and Mr. Smith, of Helensburgh. We all tested the governor, and on comparing notes we found that the instrument performed its work in substantially the following manner:

With the Burner.

With a pressure of	10-10ths,	consumption at the rate of	2·76	feet per hour.
" "	20-10ths,	" " "	2·70	"
" "	30-10ihs,	" " "	2·70	"
" "	40-10ths,	" " "	2·70	"

Without the Burner.

With a pressure of	10-10ths,	consumption at the rate of	2·73	feet per hour.
" "	40-10ths,	" " "	2·55	"

You will observe that, without the burner, at 4 inches of pressure there was really less consumption than when burning under a pressure of 10-10ths with the burner. That clearly proves that the instrument is capable of doing its work well. And it is constructed of one of the most durable materials that we have, and will last for a long time. Ultimately, I believe, it will take the place of the average meter system. This is a flow regulator, which is said to consume a certain quantity of gas per hour, with a certain standard illuminating power. If the gas company reduce the illuminating power, a greater quantity of gas will be consumed, and vice versa, if the company manufacture gas of a higher illuminating power than that at which the standard of the average governor is set, they will get the benefit in having a decreased consumption in consequence of the increase in the illuminating power. I have no doubt Mr. Peebles' governor will become very famous, and will supersede other governors in which leather is used.

Mr. M'Crae—I would not be doing justice to Mr. Peebles if I did not say a word. I have devoted many years to regulators, and lamp regulators especially, and with some degree of success, and I may say if I had had the one which I now see before me, I never would have had a leather one. That is putting it shortly. I nave never, in all my experience, seen anything approaching this instrument so suited for the purpose for which it has been made. I have never seen the instrument till to-day, and I have never had the pleasure of testing it; but it is bound to give results similar to those which we have seen and heard read. And supposing I had not seen or heard anything else to-day, I should have felt my visit to St. Andrew's largely rewarded in witnessing the experiments with this pretty little instrument, and in listening to a paper so full of instruction. I have great pleasure in expressing my approval of the instrument; and I trust Mr. Peebles will be largely rewarded for the great thought, consideration, and expense which must have been the cost of bringing out such a perfect little instrument.

Mr. Young—I have scarcely anything to add, with this exception—that Mr. M'Gilchrist gave the whole three of us the credit of being at the testing at the one time. Such was not the case, because I made the experiments, so far as I was concerned, personally, and some days before Mr. M'Gilchrist and Mr. Smith. It was some days afterward that we compared results, and I was much pleased to find they were substantially identical. I submitted the instrument to the most severe tests, and, do my best, could not get it to vary, either with or without the burner. I may remark that I am thoroughly convinced that the principle on which this instrument is constructed is the most perfect principle possible. Nine or ten months ago I had a conversation with Mr. M'Gilchrist, and a similar idea was then suggested to us, the only difference being that, instead of having a little cone with an orifice at the cap, I proposed to use a flat disc with a hole in the orifice, working in a cylinder. I think there is not the least doubt that this will supersede all modes of regulating the quantity to be consumed by street lamps and stair-lights. The instrument has, further, this advantage, that it is not only a mere governor with a given sized burner, but a flow-regulator, which prevents any variation in the consumption, whether you use a larger or smaller burner. The apparatus is so essentially correct in its mechanical details that I believe it will be reduced to even less space than that which it now occupies. If the flow measurer could be reduced in size by constructing it in the form of a burner with a movable disc, such as I have just indicated, I have not the least doubt that it would be very extensively employed, and with very great advantage, by parties having various flats.

Mr. Macpherson—I feel greatly indebted to Mr. Peebles for his ingenious little instrument, and I have no doubt it will be found to be of great advantage to gas companies generally. We are considerably indebted to Mr. Peebles for many improvements, and perhaps he might add to our obligations by favoring us with a little instrument that will record the number of hours that a lamp burns—that would start when the gas was turned on and stop when it was turned off, and then we would have the exact volume and the exact number of hours, and thus we could arrive at a perfect calculation of the quantity of gas consumed in public lighting.

The President—I may say that Mr. Peebles sent me the other day one of his little instruments. I had not time to put it to the test, so as to bring results to this meeting, but I did try it, and from the reports of other gentlemen, I think we may take it as a settled fact that this instrument is one which will fulfill the duty required of it—namely, to give a constant quantity of gas with an inconstant pressure.

Mr. Watson—How does the cost of it compare with the old regulator?

Mr Peebles—Well, I want to manufacture them as cheaply as the others if I can. I am exceedingly obliged to you all for your kindly expressions of approval of this little governor. It has cost me a good deal of thought, time, and labor; but the expressions of approval from so many of you are quite a sufficient reward for anything I have done. With regard to the remark by Mr. Macpherson, I may state that what he suggested is a thing which I expected to have been able to have shown you to-day, attached to the governor, but which, owing to pressure of time, I was unable to complete. On some future occasion I trust to be able to submit a governor with a timepiece attached, and to give a full description of it.

On motion of Mr. James Whimster, a cordial vote of thanks was given to Mr. Peebles.

[Official Report.—Continued from page 153.]

THE NINTH ANNUAL MEETING OF THE NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Held at Boston, Feb. 19, 1879.

Mr. Forstall—The referees used one burner for from sixteen to twenty candle power.

Major Dresser—Does not the board of trade furnish a sixteen and eighteen candle standard?

Mr. Forstall—I think not; Mr. Sugg makes the burner, and the referees only use one. Mr. Sugg sells the sixteen and the eighteen burner.

Major Dresser—I have certainly seen Mr. Sugg's test burner—one sixteen and one eighteen—certified by the board of trade.

Mr. Forstall—Certainly; they are certified as copies of the standard which they suggest, but they are not suggested by the referees. They use one standard for all gases—except cannel coal gas.

Col. Armington—I think this thing was wound up by Col. Stedman's statement, when he told us about the "intensity of the zones." That winds it up, It puts me in mind of what was said by a backwoodsman on one occasion. One of his comrades had the misfortune to get very badly wounded by the premature discharge of a rifle. The surgeon had him in charge, and this friend thought he would go up and see how he was getting along. The surgeon met him at the door, and, with a liberal use of latin, convinced him that "the thing was up." The man went back, and, when he met one of his confreres, he says, "there is no chance for Joe at all; for I have been to see the doctor, and he says there is no hope for him; the latin parts of his bowels are all blown away."

Col. Stedman—I was not aware that I was wandering so far from the understanding of my hearers. I had forgotten, when I made the remarks, and used the word which seems to be so foreign to my friend's ordinary dialect—I might have explained it had I not forgotten the fact that the gentleman has been absent from New England for some time, and he naturally must have dropped words of that calibre out of his mind. I am very sorry for having used language unintelligible to him. I stand corrected.

The President—Mr. Greenough has extended an invitation to the members of the Association to visit the Boston Gas Works at any time when it may be their pleasure to do so. What action will you take in regard to the matter? Shall the invitation be accepted for to-morrow morning at ten o'clock.

There being no objection, the invitation was accepted for that hour.

The President—Will it be the pleasure of the Association to hold an evening session in these rooms?

The Secretary—I move that we hold an informal evening session.

Mr. M. S. Greenough—I do not think we have ever been able to hold an evening session that amounted to anything. If we want to have another session we have all day to-morrow to do it in. I hope there will be no evening session held here to-night.

The Secretary—Several gentlemen will be about the hotel, and would like to be here together to-night. There will be some new methods of burning gas, and of using gas for fuel, shown. I have a gas stove that I intend to send for, and let the gentlemen see it; and I think that some of us can employ the time very pleasantly here in the evening. The other room will be closed, or will be for the use of the public. We can meet in this room in an easy way. I would not make any motion to that effect, but I would say this; that considerable time has been expended on this subject, a very important one indeed, and some of the gentlemen would like to hear some remarks from those who have used oil for enriching. It has been an important subject—the relative values of cannel coal and of oils as enrichers. It has come before the meeting of the Gas Club, and the discussions have been very interesting. There seems to be a very great interest taken in the subject. I would like to hear some discussion upon it before we leave.

As there is no mention made of the semi-annual meeting in the by-laws, I would move that that meeting be held in August next, and that the whole subject, of fixing the time and place of meeting, and of making the necessary arrangements, be referred to the board of directors.

The President—You hear the motion of the Secretary, that the semi-annual meeting of the Association be held in August next, and that the ar-

rangements for the holding of it, and the fixing of time and place be left with the board of directors.

A vote was taken, and the ferogoing motion was adopted.

Mr. M. S. Greenough—I think, Mr. President, we may settle this question of a burner. I offer this resolution :

"*Resolved*, That it is the sense of this Association that the burner marked 'D,' in the last series of burners made by Mr. Sugg, be the one which shall be ordinarily used in the tests made by the gas companies represented in this Association."

It might be well to put in there that it is the London Referees' burner.

Mr. Cushing—I should object to the resolution ; and I have various and good reasons for doing so. I recollect, before I was connected with this Association, a very hard tussle that was made with the legislature of the State of Massachusetts, in making a law that should be acceptable to all the gas companies of the State. Now, Mr. President, the result of the combination I might say, with all the gas companies, and with all the legislatures of Massachusetts, was this, "that the standard by which gas should be measured in Massachusetts, was a fifteen-hole argand burner, with seven inch chimney," and it should be, beside that, the burner best adapted to the gas made by the company furnishing the gas. Now, I am willing to stand by that standard. We have stood by it for more than twenty years, we will say, in round numbers ; I do not wish to have the standard altered. I am going to use a Sugg burner, because I understand he makes a burner that is adapted to twenty-candle gas.

Mr. Greenough—Do I understand you to say that his burner is better than the one you are now using ?

Mr. Cushing—No, sir ; I am using a very poor burner at present.

A member—About adapted to the standard of gas you are making. (Laughter.)

Mr. Cushing—The resolution which the gentleman offers will affect the manufacture of my gas most decidedly. It is now according to the Massachusetts standard ; and the Massachusetts standard is the English standard, and it is the standard of the world. I object to the resolution, decidedly.

The President—Gentlemen ; are you ready for the question ?

Col. Armington—I hope that the resolution will pass. Our friend Mr. Cushing's remarks have put me in mind of a celebrated lawyer who pleaded a case in Wisconsin, and he cited very many of the best authorities to show that his construction of the law was correct. His opponent, being a lawyer of that state, and rather of a stump orator, in replying to him, said he thought that was all very well—all those things that had been quoted from the English authorities ; but he wanted to know what that had to do with the law of Wisconsin. It is just so with friend Cushing's ideas. If the State of Massachusetts has adopted a standard, the other states of New England have not done it, and the other states of the United States have not done it all. If, by simply passing this resolution, we are going to disarrange the few photometric experiments made with the apparatus of some of the Massachusetts gas companies, I do not know why that need deter us. Perhaps, if the expense is very heavy to friend Cushing, there might be some way provided to defray that expense for him, or to get a new burner for him. It seems to me we should use a standard.

Mr. M. S. Greenough—I do not mean an established standard which is to test all gases in this State. I distinctly say that you cannot make a "hard and fast" standard on this subject at all. But as long as there is a sentiment among the gentlemen present that they would like to have a standard burner, in making their tests, so that they may know what they are about in *making comparisons*, I have drawn up this resolution :

"*Resolved*, That it is the sense of this Association that the "London Referees' burner," or the one marked 'D,' in the series of burners made by Mr. Sugg, be the one ordinarily used by the gas companies represented by this Association in *making comparisons*."

Col. Armington—I should add—"and is hereby recommended by the engineers of this Association."

Mr. M. S. Greenough—This Massachusetts standard is a perfectly correct one ; but that does not interfere with this resolution. When that question was brought before the legislature, many companies in this State were making fourteen candle gas, and some twenty, and some sixteen. It would have been ridiculous to hold all the companies to make and compare their gas by the same standard burner. The great majority are now making about sixteen candle gas. The object of the resolution is that gentlemen *ordinarily* may make that burner the standard, so that we may know just what we are talking about, in comparing with each other the quality of our gases.

The President—The question is on the passage of the resolution.

Mr. Greenough read the resolution, as follows :

"*Resolved*, That it is the sense of this Association that the "London Referees' burner," the one marked 'D,' in the last series of burners made by Mr. Sugg, be the one that is ordinarily used in tests made by gas companies among themselves for the purposes of comparison."

The vote was taken upon the foregoing resolution, and the resolution was adopted.

The President—I have the pleasure of introducing to you Mr. F. C. Sherman, of New Haven, who has prepared a short paper upon "The Tests of Meters."

Mr. Sherman—I have heretofore read a paper calling attention to meters—that greater care should be paid to them ; and, as a supplement to that paper, I would like to say a word in regard to the tests of our meters for the last year. We have tested 1440, and approved, as correct, 984—registering against the consumer, 59 ; against the company, 375.

STATEMENT OF METRES TESTED DURING YEARS—

	1873.	1874.	1875.	1876.	1877.	1878.
Number tested.....	3097	2371	1111	971	2184	1440
" proved correct.....	2520	1898	917	655	1572	984
" registering against cons'r	88	33	14	58	60	59
" " " gas co.	477	433	173	238	537	375
" " not at all.....	12	7	7	20	15	22

Last year the greater part of the error in registration against the gas company was from 5 to 6 per cent. on the meter ; 53 of the 375 being from 10 to 12 per cent. out of the way.

In the previous years, when the testings first commenced, a much larger proportion were 10 per cent. and over in error.

The President—It is suggested that this paper be published with the table of statistics which has been prepared.

Mr. Cabot—I would like to inquire of Mr. Sherman if he has any knowledge of the age of these meters which he tested.

Mr. Sherman—Yes, sir ; I have. They were comparatively old meters. We have not had occasion to buy new meters for the last three or four years.

Mr. Cabot—Any particular manufacture of meters ?

Mr. Sherman—Our meters are mostly confined to the make of two manufacturers.

Mr. Cabot—And what did you find out as to the particular cause. Was it in the diaphragms ?

Mr. Sherman—Yes, sir, in part. The greatest complaint in regard to them was leaking in the packing.

Mr. Cabot—Was it the valves ?

Mr. Sherman—Yes, sir ; the valves wanted cleaning, perhaps.

Mr. Cabot—In those that did not register you found the diaphragms fractured ?

Mr. Sherman—Yes, sir.

The Secretary—While we are on this subject, I would like to ask Mr. Dwight if he has not made a thorough inspection of all his meters within a year or two, and what was the result ?

Mr. Dwight—I have not made a thorough inspection for the last year or two. Two or three years ago I went through with the meters. I think I made a statement in regard to them at that time. But we inspect our meters ; we go through with one-third of them every year—or intend to ; and the results are about the same as my friend from New Haven, Mr. Sherman, shows. The majority of them are against the company.

The Secretary—Do you inspect them on the shelves ?

Mr. Dwight—We take them to the workshop.

THE DAVISON RETORT.

Col. Armington—Lasf year I became very much interested in a few inquiries I made of the Secretary. He told us, in answer to some interrogatories, that he was not prepared to make any extended report ; but, as I understood him at that time, he had introduced into his works a new kind of patent retort, by which the production of those retorts amounted to a very large quantity of gas, and that one-half Penn coal and one-half ordinary Provincial coal would produce a large amount of seventeen-candle gas without the use of any Cannel coal. I want to know whether he does, after one year's experience, find those results to be true, and that everything is working in as economical a manner as he then supposed they would work.

The Secretary—When I intend to make important statements before an association like this I prepare myself. I have made no preparation now, and had nearly forgotten that I was using the Davison retort. At one time I used three benches of that kind of retort, and by comparison of production, I made 33 per cent. more gas with the Davison benches than with the ordinary benches. Now I am using some of the Davison retorts and some of the ordinary retorts. The last retorts that I let down were of the Davison pattern, and had been running sixteen months. Now, those results are very good indeed. I have not made gas of a very high candle power ; it ranges from 16 to 17 candles. The tests last year, made by my assistant one mile from the works, gave a little less than 16 candles, on the average. But the State Inspector was kind enough to give me, in his report that he made to the Legislature, credit for 16½ candle gas.

All of us have made great improvements lately in gas manufacture, and

some of my friends say, "If you should go back to the use of the ordinary sized retorts, your results would be just as good as they are now with the Davison retorts." It may be so. We are all learning by experience. We are studying economy in every direction, except in the matter of our own salaries, perhaps. In everything connected with the retort house, especially, we are practicing economy; and somehow or other I am getting a great deal better results than I was getting a few years ago. I am told that it is not owing to the Davison retort.

Col. Armington—Do you have them all through your works?

The Secretary—No, sir; I am using three benches of Davison retorts and one of the other. Of course I do not use as many retorts as the Boston Gas Light Company, but what I use are good, and the gas I make, though comparitively small in quantity, is satisfactory to the public.

A Member—You do not wish to make the statement that you are making 33 per cent. more?

The Secretary—I think if I were using the common retorts I should make very good results. From the experience I have had, and what I have learned from visiting other works, I now obtain excellent results. I do not think it is all owing to the Davison retorts.

Mr. Greenough—And you get as good results from other retorts of the same size as the Davison retorts?

The Secretary—I think I might, from the way the furnaces are constructed. I am using the Green Bay coal, which is villainous. I could not give as good results as with standard American coals. It does not affect the retorts, but affects the furnaces. The sulphur in these coals is very injurious to the furnaces.

Col. Armington—Would you recommend to-day the adoption of these retorts to the exclusion of all others?

The Secretary—I do not know that I would. I cannot answer that question. My superintendent, who is present, smiles at this. He says he can get along just as well with ordinary retorts; but then he is only a *practical* man at the works. He is not a scientific man, as the rest of us are. He thinks that if I give him benches or ordinary sized retorts he can get just as good results from them as from the Davison retorts.

A Member—Don't you think so, too, sir?

The Secretary—Well, I am not prepared to answer the question. The reporter is putting down everything we say, and we ought to be cautious as to what we intend to go out from this meeting to the public.

Col. Armington—I think, in addition to being cautious, we ought to be truthful.

The Secretary—I appreciate the force of the Colonel's remarks. He comes from Brooklyn, and his natural tendency is to exaggerate very much. [Laughter.]

Col. Armington—I do not exaggerate 33 per cent., though.

The Secretary—I certainly think this discussion is very instructive, It is to me—particularly so. I understand that our friend Gerould has had some experience with the Davison retorts. I hope he will tell us what his experience has been.

Mr. Gerould—I was induced, through the statement made by Mr. Neal, to order a bench of the Davison retorts. Of course, our works are small. We don't make a great deal of gas. We fired up about the middle of July, and worked it along very easy. Near the last of August or the first of September I wanted to use 50,000 or 60,000 feet of gas a day. I requested Mr. Davison to come and show me how to run that bench. The best I could get out of it, under the best circumstances, was 54,000 or 55,000 feet. Mr. Davison said it was easy enough to get 60,000 feet out of it. I told him he might have the works for a week, and he could see what he could do. He said he would accept the offer. Well, a little later, I put on another bench. I thought I would see what I could do with common retorts; and the best I have been able to do with the Davison retorts was to charge with 1,700 pounds of coal in each of these retorts. In the common retorts I have reached 300 pounds per retort, or 1,800 pounds per bench. That is my experience with it.

The Secretary—Mr. Dwight, of Springfield, has had some experience in this matter. We should be glad to hear from him.

Mr. Dwight—I never had any Davison retorts.

The Secretary—I mean what has been his experience with ordinary retorts—heavy charges.

Mr. Dwight—I have used the common retort, and with good results. Of course, we all know that in order to get the gas out of the coal, and a large quantity of it, we must use pretty strong heats. To show you how I am obliged to run, I will say that, just at this time, I am using three benches, and some days I do not find room for my gas. I shut down my dampers. I get 134,000 to 135,000 feet out of the three benches. Then comes a dark day, and I want the gas; I pull up the dampers, and put on coke, and then I get 154,000 feet out of the same benches. That is the way I have to run. I cannot run steadily.

A member—You do not say what was the average number of retorts that you used in a year, and how much to a retort.

Mr. Dwight—We have this difficulty, that we cannot run our retorts to their full capacity, because we have not the consumption, and we cannot do with two benches, so we run three; and, of course, we are obliged to run in the way I have described. It seems to me that if I could only have full swing at it with my benches, and do all I could do, I should be ready to tell the story of what I could accomplish.

My retorts are 26×14, and 9 feet long, and I have no difficulty in producing that amount of gas, from time to time through the winter, just when I want it. When I made the statement last winter some thought that I got up the story for the occasion. I tried it over again this winter, and I find I can do the same thing when I require it. I hope the gentleman will go on, and we shall all go on, improving. We certainly have made great strides in gas making since we first came together as an Association; and it shows the importance of our coming together to exchange ideas with one another on all these subjects. It certainly is of great value to all of us. I have been very much interested to-day in the discussion. As to the illuminating power of gas, I do think the burner has something to do with it after all.

Mr. Gerould—What Mr. Dwight says, as to what he can get out of a bench, I believe at this time; I did not last winter, when he said he could do it. I went home and thought I would try it. I will state that our largest consumption last winter was 122,000 for two weeks. I made from 104,000 to 114,000 with two benches, running 1800 pound charges in the common bench, and 1700 in the Davidson. I understand, Mr. President, that you have been using the Davidson retorts, and I want to know what your experience has been.

The President—I will say that I have two benches of the Davison retorts now in use. They are set in a bed of fives. The upper retort is the largest retort I have ever seen. I have been able to carbonize in four hours 450 pounds of coal in that retort. I use on an average 1,600 pounds in five retorts, and I could burn off 1,800. The air flue which Mr. Davison put in, which was to be such a perfect success, has never proved of any benefit. It was abandoned immediately upon trial. The only merit which, in my opinion, can be claimed for the Davison retort is the large surface it gives for the placing of the coal, in distinction from the common retorts. I was using the ordinary retorts, five in a bench, 14×22, from 1,100 to 1,200 pounds of coal per day. I have used 1,800 pounds in the Davison bench occasionally. I believe the larger the retorts, and the more coal carbonized in them, the cheaper it is.

Mr. M. S. Greenough—Have you any reason to suppose that you will get more from your retorts being of this shape than from an ordinary retort having the same surface?

The President—No, sir; I am only making comparison with the common 5's that I have been using.

Mr. Gerould—How much increase in candle power have you noticed?

The President—Not a particle. I have tried the pushing of the coal back, and I have tried pulling it forward, and there was no increase in candle power or yield—that is, "candle feet." But the only fact which I can state in regard to the Davison retort, of which I have used two benches, is that they have been in continuous use since last August. I do not think that Mr. Davison has any right to claim anything in regard to that retort; because it was not manufactured by him. It was manufactured by other parties. The retorts are intact, and in good condition, working to-day; and, as I said, I have carbonized 1,800 pounds of coal on each bench per charge, which gives me over 7,000 feet of gas daily per retort. That is caused simply by the additional coal we put into the retorts.

Mr. Greenough—Are all your retorts of the same size in your Davison bench?

The President—No, sir; the upper retort is very much larger. It is enarged on each side, so that it almost fills the space. It measures across the bottom in the widest part, 4½ feet, outside. We put 450 pounds of coal into it.

Mr. Forstall—I should like to ask the question of Mr. Dwight and Mr. Gerould, whether they are very much troubled with stopped stand pipes with this large yield? In our works we ran 1,700 pounds for a long time, and made between 51,000 and 52,000 feet. The stand pipes of the upper retorts were constantly filling up—occasionally two or three times in the same day. I should like to know whether they have had the same experience when they were running their heavy charges.

Mr. Dwight—Yes, sir; we have to attend to those things. You cannot get up a big heat, and get those results, without the stand-pipes stopping up.

A member—We are in that trouble; I would like to have you tell me how to get out of it.

Mr. Dwight—I should like to know that myself.

Mr. Gerould—I have had eight hundred and odd street lights go out

part of the month, and my men do scold when their street lights go out. The heats are so high that one or two of the upper retorts are stopping up part of the time.

The President—You get a little pitch out of the hydraulic mains occasionally?

Mr. Dwight—Yes, sir.

Mr. Stedman—I have two plans here, one of them showing the friction condenser which we have erected in the past year; another, our method of repairing a cracked tank, which are for inspection.

On motion of Mr. Dwight, the Association then adjourned to meet at the Boston Gas Light Company's Works to-morrow morning, at ten o'clock.

SECOND DAY'S MEETING.

An adjournrned meeting of the Association was held at the Superintendent's office of the Boston Gas Works, at 10 A. M., on Thursday, the 20th. There were about thirty members present. The meeting was called to order by the President, and an informal discussion followed upon various matters of practical interest to the members.

Quite an interesting discussion took place upon the value of coal tar as fuel.

Mr. Cabot, of Lawrence, stated that inasmuch as they had sale for more coke than usual, they had been burning their tar under their benches, in order to supply the demand for coke. The increased demand for coke was very marked, although the price for anthracite coal was very low, and that he had found that coke, at $3 per chaldron, was equivalent to tar at $2 95 per barrel of 42 gallons; and that the use of steam in injecting the tar into the bench would prevent the smoke if properly managed. He had used the steam in such a way that the steam was introduced ahead of the tar in the burner. And he found that he could regulate his heats just as well with a tar fire as with coke. He recommended the use of tar as fuel so long as the price obtainable for tar was as low as at present, and the demand for coke was as good as now. He had been obliged to purchase coke from the Boston company, and transport it to Lawrence, to supply his regular customers.

Mr. Gerould had found great economy in the use of tar in old benches where the furnaces were considerably burned out. He used about 67 to 70 gallons of tar and three bushels of breeze a day for each fire. In using coke in his furnaces he found that, with new ones, it took from 45 to 48 bushels per fire per day, while, with old benches, when the sides of the furnace were burned out, it took from 60 to 80 bushels. It was in such furnaces as these that he found advantage in using the tar until such time as he had opportunity to rebuild. He had used an arrangement for injecting the tar, which he had made himself, by taking an ordinary pipe 15″ long, 1½″ diameter, with a 1½″ T piece on the end. The steam was introduced by a ⅜″ steam pipe; several other gentlemen gave their views upon the subject, which seemed to fully corroborate the statements given above. The Parson's tar burner was spoken of as giving excellent results.

The Board of Directors presented the name of Mr. J. Q. A. Spear, Engineer of the Dorchester Gas Light Company, as a candidate for membership, and upon a ballot being taken he was unanimously elected. The subject of the semi-annual meeting was informally talked over, after which the Association adjourned.

A majority of those present visited the works of the company, where everything was found in most excellent condition; many improvements having been made during the past year, the most notable of which was the new scrubbing apparatus which was just completed.

The stenographer not being present at the meeting of the second day, it is only possible to give a synopsis of the discussions that took place.

The Future of Sreet Lighting.

The gauntlet which was thrown to the ground by Edison, electric lighting companies, and Jablochkoff, has been manfully taken up by many prominent gas engineers in this and other countries; and although the contest has been fierce and destructive to many gas capitalists, it is now on the wane, and must shortly be decided in favor of gas. Comparatively few people down to the period when this war was commenced had any idea of the resources of gas—the brilliancy of its light, or the many useful purposes to which it could be easily adapted. Indeed, it may be safely concluded that the necessity for a greater amount of light than that obtained by burners in ordinary use had not been pressing; and the low standard of excellence in gas manufacture aimed at, in especially in England, was such as to induce the belief that gas, like the paraffine lamp and sperm candle, which it superseded, would give way to the brilliance of the electric light. It is needless for us, at this time of the day, to say to what an extent this belief has been confounded, or how far the opposite truth has prevailed. Everywhere, from the Metropolis to distant towns in inaccessible regions, gas managers, corporations, and companies, have been on the *qui vive* and have exhibited an amount of interest, in their different capacities, for the better and more economical production of gas, which is quite refreshing. Of course we do not look to the lesser towns to lead the way in experiments, nor do we always find that in the larger towns those who are able are willing to bear the expense of experiment; but, in cases like present, private enterprise not unfrequently steps in and proves to the world the utility of some of the schemes hatched by inventors; and in this way much has been to introduce reform in lighting as in other matters. For instance, when electricity was commanding the attention of thousands of scientists, and when prophets had proclaimed the doom of gas lighting, Mr. Sugg, the eminent gas engineer in London, was quietly developing and perfecting a burner for the consumption of gas, the first exhibition of which stemmed the tide of electricity. The public had got the idea drummed into their heads that more light was an absolute necessity, and that if the cold shoulder was given to those who promoted electric lighting our civilization must inevitably degenerate. They were altogether unprepared for the fact that a volume of light of any required intensity could be obtained from the scientific combustion of ordinary coal gas; and when this fact was established by the exhibition of Sugg's burners in operation in Waterloo Place, London, there was an almost universal feeling of satisfaction that gas was not the antiquated mode of illumination which had been imagined, and which had been so vidly pictured by those having an interest in other modes of lighting. Since Mr. Sugg first publicly tested the capabilities of his new Argand burner, he has made several improvements upon them; and with these improved burners he is now, and has been for some days past, illuminating that important thoroughfare in London known as Queen Victoria Street, from a point beginning at Mansion House Station, where Cannon Street intesects, down to King William Street at the Mansion House. The space between these two main points is illuminated by five lamps provided with burners giving a light equal to two hundred candles, and by thirty other lamps having an illuminating power of a hundred candles each. The effect produced by this glare of light is described by an esteemed correspondent to be something marvellous. He also states that so powerful is the light produced that it is possible to read a newspaper while walking across the street. Crowds of Londoners turn out nightly to witness this experiment, and there is but one feeling of delight at the effect produced. It is not for the gas companies to complain that so much gas is required for the illumination of streets, and so long as the public are willing to pay the piper, they will produce the gas; but we think that while their is ample scope for improving the lighting of all cities, there is no necessity for rushing from the one extreme to the other. However, these experiments have shown how easily and at what comparatively trifling cost powerful lights may be introduced to our busy thoroughfares, and, the necessary works being already established, how simply this can be accomplished.—*Journal of Artificial Light and Sanitary Gazette* (Edinburgh).

LARGE GAS LAMP AT WESTMINSTER BRIDGE.—The Chartered Gas Company have erected at the Refuge, north side of Westminster bridge, four very powerful gas lights, in order to show the capabilities of gas for street lighting on a large scale. The burners are "Wigham's patent," being the same as those used in lighthouses, and also for the signal light on the clock tower of the House of Commons. The burners consists of a number of fishtail jets placed close together, so that the upper extremities of their flames touch each other, producing an increased light greatly beyond the multiple of their single flames. To obviate the smoke which is caused by the combination of so many gas jets an oxidiser of talc is suspended over the flame by means of which a current of air is brought in contact with its most smoky part, rendering it not only smokeless but exceedingly white. The combustion is also assisted by a bottom cone for equalising the current of air to the flame. The oxygen of the air is thus twice availed of, first at the bottom of the flame, through the medium of the several fishtail burners; and, secondly, at the top of it, where its action raises to a white heat the large quantity of solid carbon found there. The advantage of this burner over the Argand consists in its having no glass chimney, which not only does away with the expense of breakage and trouble of cleaning, but permits of increased volume of light. The illuminating power of each burner is equal to about 400 sperm candles; the consumption is about 60 feet per hour. The gas burners are enclosed in lanterns glazed with opal and muffled glass.—*The Metropolitan* (London).

A DESTRUCTIVE GAS EXPLOSION occurred on Monday morning, March 10th, at Mr. Guy's Swiss Warehouse, the Parade, Leamington, resulting in the death of his daughter, aged nine yearr. The side and end walls of the back premises were blown down, and Mr. Guy and the deceased were found among the wreck. I appears that Mr. Guy, finding that gas was escaping, opened the doors and windows and removed some planks from the floor, and then obtained a light.—*Ibid.*

[From London "Journal of Gas Lighting."]

Southern District Association of Gas Engineers.

The first Quarterly Meeting for this year of the above Association was held at the Guildhall Tavern, London, on Thursday, Feb. 13.

Votes of thanks were passed to Mr. J. Eldridge (Richmond), the retiring President, and to Mr. J. L. Chapman (Harrow), the Hon. Secretary.

Mr. J. West (Maidstone), the President, not being able to be present, on account of illness, the following address, which he had prepared, was read by the Secretary:

GENTLEMEN—I thank you for the honor you have conferred upon me in electing me to occupy the presidential chair of this Association. I consider it both an honor and privilege to hold that position, and trust I may be enabled to perform the duties appertaining to it to your entire satisfaction, feeling assured that I may count with confident expectation upon the hearty support and cordial assistance of the members collectively.

I think we may now say that the Association is firmly established, and again congratulating ourselves upon its continued success. The members have increased in number during the past year, 49 names being now upon the books. This increase has rendered it necessary for the committee to make arrangements for our meetings to be held in a larger room.

We are much pleased with the addition to our Association of several of the London engineers, whose names and good deeds are so familiar to all of us; and the members will undoubtedly be much benefited by the information given, and the light they will throw upon many of the subjects under discussion.

At this point I should like to state that the wish of the committee is that the original object and idea of the promoters of this Association should be rigidly adhered to, especially as the course hitherto pursued has been proved to be so valuable to the members in general. Our valued friend, Mr. Alfred H. Wood, of Hastings, who occupied the Presidentship for the first and second year of our existence, when encountering some of the difficulties usually attached to the starting of a new project, was extremely anxious that we should clearly understand each other at the outset, and I cannot do better than quote his own words:—"It is distinctly understood among us that our meetings should be of the most communicative character. We are anxious to drop as much of formalities as it is possible to do, consistent with the interest and object of our meetings, and to show as little reserve, and to throw open for each other's use all those details in gas manufacture which could not be done in a more extensive association in a way we can do in our mutual gatherings."

Up to the present time we have carried out these ideas to the letter, and it has often happened that most of the members in the room have added some valuable information to the discussion. Some have thought that if the Association became too large, many of the original objects for which it was started would be impaired. When, however, we find such to be the case, it will then be necessary for us to meet the difficulty. This imagined difficulty will, I think, be avoided by other associations being formed in various important centres, where members may conveniently meet together.

Some have thought that the admission of so many eminent engineers, would prevent the younger and more diffident from giving expression to their opinions. Up to the present time, such has not been the case; on the contrary, I fully believe that their kind suggestions have often brought out some of their ideas, instead of repressing them.

We have been favored during the past year by a continued discussion upon a paper read by Mr. Brett, of Hertford, on "The Steam Jet Exhauster;" also a paper by Mr. J. L. Chapman, our indefatigable Secretary, on "The Carbonization of Coal," with special reference to the retort house. A meeting was also held at our Secretary's works, at Harrow, in May last.

The committee arranged in November for the members to inspect and examine the electric light invented by Mr. Werdermann, previous to attending a dinner, which it is intended in the future to make an annual institution.

I have been requested to make a few remarks upon the important question of the relations between gas companies and consumers. It would appear, from all that has been published in the newspapers, that gas companies and corporations have not received that consideration they were fairly entitled to at the consumers' hands, seeing that the former have supplied the public for nearly three-quarters of a century with the purest and cheapest light that science has invented. Gas companies were suddenly called upon to account in various ways for sins of omission and commission. This, however, is the customary prelude to which gas companies are accustomed when some new and visionary scheme is about to be propagated.

The electric light is the great luminary which was about to extinguish us all in this case. And here I wish to state that, as engineers and scientific men, we have no objection to any invention that may be introduced for the benefit of the public at large, but we do object to the amount of trash that has been written, which has undoubtedly caused the unwarrantable "scare" among those connected with the gas interest, brought about by the misleading statements of the promoters, and afterward dilated upon in such admirable style by the London and local press. These statements have, however, induced directors and shareholders to take a greater interest in gas matters than heretofore. They can see that local authorities in some districts would hail a competitor with delight, believing that it would upset what they term a monopoly; forgetting that gas companies are under the most rigid legislative restrictions that can be imposed upon them, restrictions which are thought by some to be alike disadvantageous to the companies and the public.

The question then comes, Have we, as engineers and managers, done all in our power in advising our companies to take such a course as would further their own and the consumers' interests generally? It may be said that the task of pleasing so many customers would be nearly impossible. I am keenly alive to the difficulties that would be met, but at the same time I believe it could be accomplished in the majority of cases; at any rate, an effort ought to be made in this direction.

My own opinion, which is founded upon considerable experience, is that gas companies, besides making good gas, should feel themselves morally bound, in their own and their consumers' interests, to do everything in their power to insure the gas being properly consumed, and use every opportunity to further their business by introducing all improvements in the gas burners, cooking and heating apparatus, gas-fittings, and every appliance that may be utilized in the consumption of gas. To accomplish this it is necessary to keep a well-stocked showroom, and thoroughly efficient workmen to properly fix and adjust the various fittings and apparatus on the consumers' premises. It has been the custom with a few of the companies and corporations to do this work from their formation, the companies and the consumers being equally benefited thereby; for in these towns you will find the most improved apparatus employed, and the work done in a good and substantial manner.

In our showrooms at Maidstone we keep a stock of gas-fittings, and all recent improvements in burners and cooking and heating apparatus. For the last 19 years it has been our custom to let out the cooking stoves upon hire, and this has considerably increased our daily consumption of gas. Most of these stoves have been made upon the premises; others have been purchased from firms who, of late years, have made cooking and heating stoves their special study. About three years since, I introduced a very simple and effective gas-fire, 170 of which are in use at the present time.

Formerly chandeliers, etc., had to be sent to the manufacturers to be re-lacquered, causing great inconvenience to the consumers; and special lights, which, as a rule, are mostly required in a great hurry, had to be obtained from the same source. This delay caused great dissatisfaction. We now do the whole of this class of work upon the premises, and keep an efficient staff of workmen to enable us to attend at once to all complaints that are sent to us by consumers, or are brought in daily by our collectors, foremen, and inspectors. Thus we often obtain an opportunity of rectifying bad fittings, introducing new burners, etc., by which means the complaints are reduced to a minimum.

I know it may be argued by some that this is not the business of a gas company, and should be done by the tradesmen of the town. My answer to this is that when you find tradesmen do their work well, they should be encouraged in every way, as they are furthering the gas interests. Unfortunately, there are many tradesmen who take up gas-fitting as a business without any previous knowledge of it. The result is that pipes are fixed much too small for the number of lights they have to supply, and the work is generally faulty; the consequence being that the gas company in most cases is blamed for inefficient supply, and for sending out gas deficient in illuminating power. Whereas, upon investigation, in nine cases out of ten the fault is found to be from the above-mentioned causes, over which the company has no control.

I contend that gas companies have an unbounded right to further their interests, and to attend to the wishes of their numerous consumers in every possible manner. Much good has been done in advancing this by the various exhibitions of cooking apparatus at South Shields, Birmingham, and in other towns. At these exhibitions, while numerous improvements were shown, it was also discovered that some stoves of excellent design and workmanship, were most ineffective, and revealed the fact that the makers of them did not properly understand the combustion of gas; hence the importance of gas engineers giving this subject their special consideration.

You would doubtless consider me remiss in my duty if I omitted to say something respecting the electric light. I will therefore, very briefly, make a few comments upon it before passing on to more important subjects connected with our profession.

Those engineers who visited Paris in connection with our parent Association saw the electric light under the most fascinating and favorable circumstances. The Societe Generale d'Electricite invited us to visit their establishment to inspect the various appliances necessary for producing the light, and we ascertained that the necessary force required was upward of one-horse power per light. We were also informed that they had arranged with the municipality to charge them 1s. per candle per hour for the light. We could not discover the exact cost of production, but many of us came to the conclusion, after making careful calculations, that the Societe was supplying the light at a great loss to themselves This has been confirmed by Mr. James N. Shoolbred, B.A., in his paper read before the Society of Arts, where he states that the authorities of the city of Paris showed the cost to be 2·6 times that of gas, as supplied in Paris, which we know is about double the price of London gas.

We are also very much indebted to Mr. E. F. Davis, a private gentleman, who, at his own expense, arranged for carrying out experiments upon his estate at Westgate-on-Sea, with a view to ascertaining whether the electric light was practicable for public lighting, and also to arrive at the cost of the same as compared with an equal amount of gas. The gentlemen selected to conduct the experiments were Mr. W. H. Bennett and Mr. W. A. Valon, whose names

are sufficient testimony that the experiments would carried out with exactitude and impartiality.

learn from their exhaustive report that the cost of the electric light in this case is five times that of the London gas at 3s. 6d. per 1,000, when giving the same amount of light. They have also come to the conclusion that "if electricity is to be the light of the future, it must be produced by a radically different system to any yet brought before the public."

The Chartered Gas Company has also been carrying on experiments, and we are much indebted to them for making them of a public character. From a report just issued, I find they have been lighting one of their large rooms with the electric light, under the most favorable circumstances, and even then the cost was four times as much as gas of an equal illuminating power.

In these experiments it must be observed that nothing is charged, in the accounts of the electric light, for interest on working capital, depreciation of building or cable, and I presume a little should be added for profit, which would add very much to the cost already given for producing the light.

In November last, as before stated, our committee made arrangements for our inspection of the Werdermann light, when Mr. Werdermann described the means he employed in subdividing the light, and answered in a very cordial manner any questions put to him. Those present will bear me out in saying that the approximated power of the light was very much exaggerated, and the amount of force required was also, as usual, kept in the background.

For more minute details on this subject I must refer you to papers so ably written by Mr. A. H. Wood and others, to the experiments at Westgate-on-Sea and at the Chartered Gas Companies works, and likewise to a paper read by Mr. R. P. Spice to the Society of Engineers on Feb. 3, the whole of which will be found in the *Journal of Gas Lighting*.

One argument of the promoters of lighting by electricity is that their light is more applicable to the illumination of large areas, and this statement was accepted by the public in general until the Pœnix Gas Company, at the suggestion of their enterprising engineer, Mr. C. Woodall, resolved and obtained permission to light up the Waterloo Road, to show what illuminating power gas was cabable of producing when consumed by large burners and under favorable conditions. At the most important points Mr. Sugg's large Argand burners, ranging from 50 to 200 candle power, were employed, and at the intermediate distances lamps with opal tops were arranged closer together than usual, and batswing burners of suitable size for producing perfect combustion were used. All who have seen this lighting have pronounced it to be a great success.

The Chartered Gas Company has also carried out this new system of street illumination, having fixed a number of Mr. Sugg's improved lanterns and burners between Pall Mall and Piccadilly Circus. These exhibitions have brought about a change of opinion in the public, and gas shareholders feel reassured now they see that gas is capable of producing an illumination equal to the electric light, that it is much cheaper, and far superior for public lighting generally. The thanks of the gas community are therefore due to these gentlemen for inaugurating these valuable experiments, and we may also thank the electricians for giving us a opportunty for displaying the utility and power of gas when properly used. The public now understand that vestries and public bodies can thoroughly light the thoroughfares with gas if they are prepared to pay a little extra for it.

The advisability of using the recently improved gas engines as a motive power for driving gas exhausters, etc., has been brought forward in the *Journal*, and deserves our attention and consideration. I have recommended their use in our district, where several small ones are at work, and from what I have seen of them, I am convinced that they are most efficient and economical A few days since I ascertained the cost of gas used for driving these engines, and I append the results, as they may be useful:

No. 1.—3½-horse power Otto silent gas engine, used for driving two large lathes, planing machine, circular saw, and grindstone. 70 cubic feet of gas per hour.

No. 2.—2-horse power Otto silent gas engine pumps 2,000 gallons 100 feet high per hour. 50 cubic feet of gas consumed per hour. Left without attention for hours.

No. 3.—3½-horse power Otto silent gas engine, with the latest improvements. In engineer's shop, and works two lathes, one drilling machine, fan for blacksmith's forge, and grindstone. 55 cubic feet per hour.

Experiments have also been made very recently with an 8-horse power Otto, when the consumption of gas was found to be 24 cubic feet per horse employed.

An important meeting of the Associction was held at the Guildhall Tavern on the 23d of January, to which directors were invited, to consider what would be the most advisable course to take in disposing of their coke, in view of the new Weights and Measures Act coming into operation. The subject was fully discussed, as will be seen from the report in the *Journal*. In matters of this kind, we feel that our District Association is very valuable to the companies whom we represent.

Up to the present time I have been dealing with matters connected with gas chiefly outside the works. It will now be well to refer to the paper read by our Secretary on "The Carbonization of Coal," with special reference to the retort-house. This being the most important part of our gas plant, and where the dividends have to be made, it is therefore very essential that it should receive our first and earnest consideration.

That important strides have been made in the retort house of late years is patent to all gas engineers, but there still remains very much to be done. The discussion upon the paper named revealed the fact that many of us were working in our own particular way and under various conditions, although most of us were using Newcastle coal. Certainly there must be a way superior to all others; I therefore consider that there is scope for many more papers connected with the retort house, and invite the members to take up the subject of the Siemens and other furnaces, the proper area of flues and chimneys, the size and shape of retorts, and whether short or long retorts are the most advantageous. Also the best temperature for distilling Newcastle or other kinds of coal, and if it is advisable to dispense with the hydraulic main. I have White's patent automatic valves, fixed so that I may dispense with the main if necessary, and at the present time the valve works with great success

You are aware that I have given the retort house my especial care and study for some years past, and for your information and encouragement I am sure you will be pleased to know that my efforts have been most successful with my drawing and charging apparatus, working in the new retort house, which has been in action some months, and that the economy effected has thus far exceeded anything that my friends or myself have stated or anticipated.

Next in order is the condenser. The shape, extent, and cheapest form are well worth serious attention. Although two meetings were occupied in discussing a paper read by Mr. Brett on "The Steam Jet Exhauster," it is thought by some that we should like to have more information upon this important subject.

Then comes the very important question of washers and scrubbers, of which several forms have been introduced. I have adopted the Livesey washer in the arrangement of our new works. It is a small and very inexpensive vessel, and I am informed by those who have it in use that it does excellent work, and is a great auxiliary to the water scrubber. It is to be hoped that Mr. Livesey will be successful in his experiments, and be able to produce an equally effective and inexpensive water scrubber.

We next come to the purifying plant, where, in the ordinary purifying process, the sulphur bugbear has to be dealt with, and where its removal is compulsory. A considerable amount of chemical skill is required to meet the many difficulties that here present themselves.

I shall be glad to see the time when cumbersome open vessels, requiring frequent changes of purifying material, can be dispensed with, and this part of the process carried out in closed purifiers. Some experiments in this direction have been, and, I believe, are still being carried out at the South Metropolitan works, and also by Mr. Hammond, of Lewes, who has kindly sent me the results of his last successful experiment, and these I now lay before you:

Cost of Gas Purification,

With Automatic Ammonia Apparatus, and the Gas passing through Two Lime Purifiers, ten feet square, from November 19, 1878, to December 25, 1878—37 days.

Gas made, 37 days.....	6,500,000 cu. ft.....	—
Coal used.....	684 tons.....	—
Lime used .....80 × 3=240	bushels.....	£5 0 0
Purified per bushel of lime.....	27,083 cu. ft.....	—
Purifiers opened three times, loss of gas...	6,000 cu.ft., at 4s.7d.	1 7 6
Removing foul lime....	at 5s. 8d.....	0 17 0
Sulphur average.....	8 to 12 grs. per 100 ft.	—
		£7 4 6

0·26d. per 1,000 cubic feet.

Cost of Gas Purification,

With Ordinary Apparatus, and the Gas passing through Two Lime Purifiers, ten feet square, from December 25, 1878, to January 30, 1879—37 days.

Gas made, 37 days.....	5,500,000 cu. ft.....	—
Coal used.....	579 tons.....	—
Lime used .....80 × 7=560	bushels.....	£11 13 4
Purified per bushel of lime, say 9,982	10,000 cu. ft.....	—
Purifiers opened seven times, loss of gas....	14,000 cu.ft., at 4s 7d	3 4 2
Removing foul lime....	at 5s. 8d.....	1 19 8
Sulphur average.....	20 grs. per 100 ft.....	—
		£16 17 2

0·73 per 1,000 cubic feet.

The above results were obtained by using an experimental apparatus, capable of dealing with only 50 gallons of liquid per hour, automatically prepared by the waste steam from the engine. The foul gas—sulphuretted hydrogen—was delivered from the apparatus, and measured by meter at the rate of 60 or 70 cubic feet per hour; the carbonic acid was condensed into crude carbonate of ammonium, and a small quantity of a volitile hydrocarbon oil. By this method of coal gas purification, naphathaline is unknown, the quality of the gas is greatly improved, and, strange as it may appear, the public lamp glasses remain clean for double the ordinary time. Occasionally sulphuretted hydrogen was absent from the outlet of the clean-water scrubber; and, without doubt, the strong alkali ammonia used as described in my specification was capable of dealing with all the ordinary impurities of coal gas as effectually as the materials more generally used for purifying purposes.

If such results can be continuously maintained upon a large scale, Mr. Hammond will have relieved us from many difficulties, and I trust he will be rewarded for his zealous investigations.

At Maidstone we are under no restrictions for sulphur compounds; nevertheless, the sulphur fever rages there very strongly, and the subject is brought before the public in a very erroneous and misleading manner. The directors decided, however, when enlarging their works, to arrange for the removal of the

sulphur compounds, and some of you are aware that I made experiments which I considered of great importance, because they would enable us to purify our gas from the "objectionables," without causing much nuisance, and at the same time continue to use a large proportion of oxide in the process. To do this it was necessary to arrange the purifiers so that they could be worked in any order. I consulted four of the most eminent chemists of the day, and they considered that the experimental results obtained were rational, and advised that I should carry out my plan upon a large working scale.

I anticipated that I should be able to lay the results of my working before the members at this meeting, and, in fact, promised to do so; but I regret to say that the contractor has only just completed the purifiers, whereas they should have been working 3 months ago. I will, however, give you the outline of my plan, and, if your purifying plant will allow, I think it would assist the objects of this Association if those who feel interested in the subject were to work out a series of experiments for themselves, so that eventually we might compare the results for our mutual satisfaction.

You are aware that up to the present time sulphide of calcium (CaS) is the material used for taking out the sulphur compounds from gas on a manufacturing scale, and the practice is to turn foul gas into a clean lime purifier, to abstract the carbonic acid (CO_2) and sulphuretten hydrogen (SH_2). The former compound converts the lime into calcium carbonate (CO,CaO)—a useless material, when once found in our purifying boxes; the latter forms, with the lime, calcium sulphide (CaS), whice we utilize for abstracting the sulphur compounds. The carbonic acid in the gas, however, from its greater chemical affinity, energetically displaces the sulphur from the lime existing as sulphide of lime, enters into fresh combination with the lime, and forms the useless carbonate. It is necessary, therefore, to keep your partially sulphide purifiers free from carbonic acid by continually placing clean purifiers in front, for its removal. I found, however, when I saturated the lime with sulphuretted hydrogen, and converted it into a sulphide quite free from carbonic acid, that it would remove the sulphur compounds from a very large volume of gas, if the same were passing through quite free from sulphuretted hydrogen and carbonic acid.

Having first got the purifiers sulphuretted as described, I work them in the following order:

1. Oxide for sulphuretted hydrogen.
2. Sulphide of lime which absorbs the carbonic acid.
3. Sulphide of lime for sulphur compounds.
4. Clean lime, which, absorbing some of the constituents of the first lime purifier, broken up by the CO_2, and driven forward with the gas, is being partially prepared in its turn to act as a sulphide purifier.

Finally, the gas goes through the check oxide purifiers, to arrest anything that may come over with it.

This breaking up and displacing in the first lime purifier I allow to go on until it shows carbonic acid freely, when I know that it is then mostly carbonate, and therefore of no use in the purifier, and in that state can be unloaded with very little nuisance, which in my case is very important, the works being situate in the heart of the town.

There are some important topics, introduced by our late President, Mr. J. Eldridge, which I should like to have touched upon, but time will not permit me to do so.

Looking at the gas interests generally, I consider that it is in a very satisfactory state, and that a great future lies before us. As I have previously stated, much has been done, but still more remains to be accomplished.

Our American friends who visited us during the summer consider the English works to be built in a good and substantial manner, and they are of opinion that if the English system of purification and the French plan of carbonization were blended, we should have a nearly perfect set of works.

It is thought by some that the legislative restrictions imposed upon gas companies are a stumbling-block to improvements, and that, in some cases, both directors and engineers are content when the maximum dividends are secured. I would advise all such to follow the example of those companies who have shown an interest in their undertaking, who, after securing their dividends, have benefited their consumers by reducing the price of gas.

I am inclined to think that there is a special inducement to directors and engineers to progress, where the sliding scale is in operation, and a chance of mutual benefit being obtained by all parties.

Undoubtedly, the surest policy of a gas company is to keep their works in first-class condition, use all the most modern and approved appliances for producing good and cheap gas, do all in their power to oblige their customers, and they will then have the satisfaction of knowing they have performed their duties to all parties concerned.

I may mention that a gas analyst's manual is about to be published, eminating from our respected friend, Mr. F. W. Hartley. From our previous knowledge of him, we may rest assured that it will be all that can be desired, and of great utility, both as a work of reference and of practical memoranda.

The thanks of our Association are due to Mr. Chapman, the father of our respected Secretary, for the handsome and cordial way the members were entertained when visiting the Harrow gas works.

The committee think it would be desirable to meet at each other's works once during the summer months, for mutual advantage; and I shall esteem it an honor if the members of the Association will pay me a visit at Maidstone as soon as convenient.

Mr. A. H. Wood (Hastings) proposed, Mr. G. Livesey (London) seconded, and it was resolved—"That the thanks of this meeting be given to the President for his address, and that the same be printed."

Oil Gas.

REPORT OF COMMITTEE ON LAMPS AND GAS, WATERBURY, CONN.

Gentlemen—Your committee recently sent by the common council to investigate the "Hodge's Patent Oil Gas," report as follows:

The first place visited was a print works at Haverstraw, N Y. Mr. John Hunt, the engineer of the company, a thorough gentleman, and well-informed in what he says, gave the following information:

Has had gas made from heavy petroleum and resin oils, but did not like the gas. Since they commenced with this gas have had good lights, and are very much pleased with it so far. They have two apparatuses of 5 retorts each, and make about a 1,000 feet of gas per hour, using 13 or 14 gallons of oil. They use ordinary 112° refined oil, such as is most commonly burned in lamps. They reduce the gas as it comes from the oil with about 33 per cent. of air pumping it into the gasometer and letting it mix there. Of course it is only a mechanical mixture, and might not burn evenly, although they had no trouble. If the proportion of air was too small, however, they had smoky, heavy lights, and if too great, thin, bluish lights, easily extinguished. Mr. Hunt thought if mixed in the proportion named it would always give satisfaction. Had been troubled with some condensation during extreme cold weather, and where about 200 feet of pipe lay out unprotected. After wrapping the pipe the trouble ceased. Had no trouble from burners gumming. Estimated the cost of gas, including wear and tear, etc., at $1.75 per thousand feet; said that a gallon of good oil would produce from 64 to 69 feet of gas. Never had used coal gas, so was unable to speak comparatively of the merits of one over the other, but was well satisfied with this gas. They used two and three feet burners, under a pressure of 8-10 of an inch, which gave them good white light, and did not blow out easily.

The next place visited was Rhinebeck. The people here have become attached to the gas for its cleanliness as compared with the lamps, and for what seems to them its low cost compared with gas in neighboring villages, where they pay $4 per thousand feet for coal gas, while in Rhinebeck the price is supposed to be $2.50, less 30 per cent., or $1.75 per thousand net. Later facts given by consumers would give the impression that although it may be a cheap light, it costs the consumer much more than $1.75 net per thousand. Here also the quantity produced from a given quantity of oil is so far in excess of that given at Haverstraw, that one can imagine the statement to be largely overdrawn. Mr. Joseph N. Towns, the person who makes the gas, attends to the collections, in fact does the entire work of the concern, and has plenty of leisure besides, makes the following fabulous statement. With our one apparatus of six retorts, I can make in one day 54,000 feet of gas ready to use, consuming about 500 pounds of coal and 50 gallons of good refined kerosene oil, without any assistance whatever. This is gas reduced 20 to 25 per cent. with air and burns with a bright even flame. This is not his exact language, but is his exact statement, and another party employed in piping for the gas company made a precisely similar one. If this be a fact the cost of the gas ready for consumption, including labor, would be less than 20 cents per thousand feet. The method of making gas in this way is by no means new. We have in our city similar apparatus, *i. e.*, the principle is the same, the only difference being the substitution of refined petroleum oil, such as is burned in lamps in place of heavier less refined oil. The man who attends to everything for the company, was unable to say how much the cost of the gas was, as all the accounts were kept by McKibbin Bros., in New York. He was, however, positive that they were making money, and if his statements are true it is difficult to see how they could help it. The stores in the village are not as well lighted as ones that are lighted with coal gas. Neither do the street lamps give as much light as ours. This is not because the gas is not good, but because their burners are much smaller. The burner in general use is said to be a 1½ foot, and with an 8-10 pressure. Our impressions are that the pressure is greater than 8-10, although we are not positive. The gas of itself is in our opinion a richer, cleaner, and more powerful gas than that made from coal and with burners of equal capacity give a considerably improved light over coal gas. In only one instance did we see three foot burners, and they gave a handsome white light. The burner in general use, and said to be 1½ foot, gave a small but good light, about two inches across, and perhaps a little higher, with a small portion of blue flame in the lower center. With such lights often enough, a room could be very handsomely lighted, but with a larger burner you could get sufficient light with the present number.

We will give you a few examples of what parties are paying, and you will see that there is much variation. The object of the company seems to be to get customers at the best rates they can. A says he averages 10 burners five hours each through the year, which, counting the burners 1½ foot, would make an annual consumption of 27,375 feet. For this he pays $150 a year, or a little less than $6 per thousand. He is well satisfied and thinks he gets light for a very low figure. B has the best lighted store in the village, uses 10 1½ foot burners, shuts up at nine o'clock, averages about two hours each through the year, consumes 10,950 feet, pays $35, or about $3.25 per thousand. This was the nearest approximation to the nominal price, $1.75 per thousand, which we found. The ceilings of this store were painted white, and after nearly a year's use of the gas shows no discoloration from the use of it, proving the absence of sulphur, which is a too frequent contamination of ordinary coal gas. The odor from this gas is very similar to that from refined naphtha, and not at all unpleasant. The Masonic hall burns 30 burners two hours four times a month, 1½ foot burners, consumes

360 feet of gas; last month's bill was $2 or nearly $10 per thousand. C runs five burners till 11 o'clock at night, averages four hours, consumes 11,000 feet, cost $54 per year, or about $5 per thousand. D runs eight burners, $70 per year. The worst case found was E—uses six burners two hours each night when lighted and the month's bill would make it cost 30 cents for 24 feet of gas or $12.50 per thousand. Other cases could be cited, but you have enough to show that the gas is paid for at a much higher rate than $1.75 per thousand. The system of registering is by dials showing dollars and cents; $2.50 is presumed to indicate that 1,000 feet of gas has passed through the meter, but the bill for gas consumed is much greater in amount than the consumer can figure up counting his burners, and the number of hours they are in use. One former customer has discontinued using it as he does not like the meters and the company refuse to use any other.

From these facts we leave to you to draw your own inferences. Such irregularities can only be overcome by giving a certain quantity and quality at a fixed price per thousand feet, and use such burners as best suit you. It is stated that the gas is five times more powerful than coal gas, but we have yet to be convinced that a one, or a two, or even three foot burner, will illuminate more than a five foot burner with coal gas. There has been no trouble from condensation at Rhinebeck and their 2½ mile pipes are said to be as clean as when put down. The quantity of tar taken from a barrel of oil by the washers, varies from one-half to two gallons, according to the quality of the oil used. The patentee claims that there is no chemical change in the number of atoms of carbon and hydrogen, that they are only loosened from each other by the heat, forming a gaseous hydrocarbon instead of a liquid one, and that they are so effectually separated by this process as to fail to reunite and form a liquid again. The subject deserves a more extended investigation than we have given it thus far before deciding fully as to cost and merit, etc. Our own observation is that a gallon of good oil will not produce as much gas as is stated by the manufacturers, but about 10,000 feet for 50 gallons of oil reduced. We omitted to mention that the company put up 15 street lamps at their own expense, and light them every night required, allowing them to burn till 12 o'clock for $20 each. A ton of ordinary coal yields from 8,000 to 11,000 feet of gas. The more bituminous the more gas is yielded, a ton of cannel coal yielding 15,000 feet.

Gentlemen—You have our report of what we saw, and learned about oil gas. The time may come when this gas will supersede coal gas, and we have no doubt this represented by Messrs. Beers & Co. is as good as any yet offered, but we do believe that when a burner of sufficient size is used to give us as good a light as we now have from coal gas, it will cost us as much or more than we are now paying; also if a contract was given to Messrs. Beers & Co. it would be at least one year before our city could be lighted. Under all the circumstances we would recommend our authorities to close a contract with the Waterbury Gas Light Company on the terms proposed, viz., $2.60 per thousand for city use and $24 per month for city lamps, ten (10) lamps to burn all night and the company to light, extinguish and clean the same, said contract to commence Feb. 1, 1879, to continue two years with the privilege of renewing said contract for one or more years after its expiration.

CHAS. I. TREMAINE,
LAMPSON P. MITCHELL,
JOHN I. MCDONALD,
Committee on Lamps and Gas.

—*The American*, Waterbury, March 14.

The Hartford, Conn., gas company has reduced the price of gas from $2.50 to $2 per thousand feet. About three months ago the price of gas was reduced from $2.75 to $2.50. In New Haven the price is $2.50; Lowell, $1.80; Boston, $2.00.

The Electric Light on the Holborn Viaduct.

The trial of the electric light on the Holborn Viaduct has now been brought to a close, the immediate result, so far as the public are concerned, being that this mode of illumination has at present been found too costly to justify its continuance. This is the statement put forward on behalf of the Commissioners of Sewers, who are responsible for the lighting of the thoroughfare in question, and we are quite prepared that, under the circumstances, they could not well, perhaps, have adopted any other course. But we repudiate entirely the idea that the electric light on the Viaduct has proved in any sense a failure. We never supposed for a moment that the new light as a mode of lighting our public streets would at once become a permanency. The experiment was undertaken with a view primarily of demonstrating the practicability or otherwise of the electric light for such a purpose, and we have no hesitation in saying that the result has proved even more gratifying and encouraging than at first we were at all disposed to anticipate. Less than twelve months ago we were told, with all the confidence in the world, that the lighting of one of the main arteries of the City by this means was something impossible of accomplishment. The fact is that the Holborn Viaduct—one of the widest thoroughfares in the City of London—has actually been lighted in this way during a period of three months, and of the quantity and character of the light afforded probably the great bulk of our readers have had an opportunity of judging for themselves. Beyond this we are not prepared to discuss the matter further at present, and we only refer to the subject now for the purpose of calling attention to the report of Mr. William Haywood, the engineer to the Commissioners of Sewers, on the result of the trial. The arrangements entered into between the Commission and the Société Générale d'Electricité have already been fully detailed in these columns, and in regard to the placing of the Jablochkoff lamps it may be stated briefly that there were 16 lamps in all; 15 were placed at intervals alternately on each side of the street, and one in the centre of the carriageway at the western end of Newgate street. The average distance apart of the electric lamps, measured diagonally, was about 110 feet, and each lamp lighted an area of about 888 yards superficial of public way. The electric lamps were lighted from sunset until midnight. The number of public gas lamps not lighted when the electric lamps were burning was 86. With regard to the question of cost, Mr. Haywood writes as follows:

"The 16 electric lamps were to be lighted from sunset to midnight at a charge of £5 per night. The average time they had been alight during the experiment is about seven hours nightly. At £5 per night for the 16 lamps the cost per lamp per hour is 10·7d. Assuming them to have been lighted for the remainder of the night, at the same rate of charge, the cost for the whole would be £10 per night, or 1s. 9·4d. per lamp per hour. A gas lamp on the Viaduct, including lighting, extinguishing, and cleaning, costs £4 17s. 6d. per annum. It is alight 4,300 hours annually, and the cost of each lamp per hour is ·27d., or but a little over ¼d. The cost, therefore, of lighting the Viaduct these winter months by electricity would be 14s. 3½d. per hour, and by gas 1s. 11¼d. per hour, or per night of 14 hours duration £10 by electricity and £1 7s. 1½d. by gas. Applying these rates to a whole year, electric lighting would cost about £3,072 and gas lighting £419. Electric lighting at present charges is therefore about 7½ times as dear as gas lighting."

As against this increase in , however, there is, of course, a very considerable increase in the quantity of light supplied, and on this point the report is as follows:

"I have not yet seen an account of the relative illuminating power of the electric light and gas light, which is admitted on all hands to be correct, although it is possible such information may exist. In relation to street lighting there are other considerations affecting the question besides that of the intensity of light at given points; I can therefore only lay before you some very general statements on the subject and such assumptions based thereon as appear to me to be reasonable, and the results given must be taken to be approximate only. Each electric lamp is said by the Société to be equal to 100 gas burners such as are used in the streets of Paris: those burners, I have reason to think, consume about the same quantity of gas per hour as those in the streets of the City of London. The illuminating power of the London gas is equal to 16 candles (London standard), whilst Paris gas; by the same standard, has a power of 12 candles, or 25 per cent. lower than that of London. If these assumptions be correct, 16 electric lamps should give light equal to that of 1,200 of the City gas lamps, and as there are 86 gas lamps on the Viaduct there should be, with uncovered lights, about fourteen times more light given by electricity than gas. The opalescent globes, which enclose the electric candles, are said to obstruct 60 per cent. of the light. In my previous report I took 50 per cent. as the reduction, and I had better adhere to that figure here. On this assumption, the 16 electric lights give about seven times more light than the 86 gas burners. It must, however, be held in mind that the electric light is given off with great intensity from 16 points only, whilst the gas is given off at 86 points. Thus the feebler light is more uniformly diffused than the stronger. For street purposes the indivisibility of the electric light and the diffusibility or quality of the light are points to be thought of when comparing the value of these two modes of street illumination. The broad results of the experiment appear therefore to be that the electric light on the Viaduct is about 7½ times the cost of gas, and that, subject to conditions under which it is given off, the illuminating power of the electric light is about seven times that of gas."

We would just remark, in conclusion, that we must not be understood as offering any opinions whatever in regard to Mr. Haywood's report. Coming from such a source it is worthy of every consideration, and on that ground alone we give it publicity.—*The Metropolitan*, London, March 15.

Bids for Lighting Public Lamps in New York City.

The following are the prices which were bid by the different companies for lighting the street lamps in New York City for the year commencing May 1, 1879, and ending April 30, 1880, (4,000 hours), in accordance with the forms and specifications furnished by the Department of Public Works:

Company.	Gas.	Lamp-Post straightened.	Column releaded.	Column refitted.	Lamp removed.	Lamp reset.	New Lamp fitted up
Manhattan	12 00	1 50	1 50	3 50	3 50	10	10
New York	12 00	1 50	1 50	3 50	3 50	10	10
Mutual‡.....	19 00	1 50	1 50	3 50	3 50	10	10
Municipal.....	20 00	1 50	1 50	3 50	3 50	10	10
Metropolitan‡....	18 28	2	2	3	3	8	8
Harlem.....	17 70	2 50	2 50	3 50	3 50	8	8
Yonkers.....	39 00	1	1	2 00	1 50	8	10
N. Y. and N. J. Globe gas-light Company‖.....	19 00	1 50	1 50	3 50	3 50	10	8

‡ Schedule. ‖ Naphtha.

At a meeting of the Gas Commission held 10th inst. contracts were awarded to the New York Gas Light Company for lighting all the public lamps south of Grand street, at $12 each; to the Manhattan Gas Company for all the lamps between Grand and Thirty-fourth streets, at $12 each; to the Metropolitan Gas Company for the lamps now lighted by that company between Thirty-fourth and Seventy-ninth streets, at $18.28 each; to the New York Mutual Gas Company for the lamps now lighted by that company between Thirty-fourth and Seventy-ninth streets, at $19 each; to the Harlem Gas Company for all the lamps between Seventy-ninth street and Harlem River, at $17.70 each; to the Yonkers Gas Company for the lamps in that part of the Twenty-fourth Ward formerly constituting the town of Kingsbridge, at $30 each. These awards effect a saving of over $18,000 rom the present rates.

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—G. WARREN DRESSER.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH
At No. 42 Pine Street, New York.

This is a recognized official organ of—
LIGHT, HEAT, STEAM, WATER-SUPPLY,
VENTILATION, SANITARY IMPROVEMENT,
AND GENERAL SCIENCE.

TERMS

SUBCRIPTION—Three Dollars per annum, in advance.

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NEW YORK—AMERICAN NEWS COMPANY, 119 and 121 Nassau St
BOSTON—S. M. PETTENGILL & Co., 6 State Street.
PHILADELPHIA—PRATT & Co., Corner 9th and Arch Streets.
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WEDNESDAY, APRIL 16, 1879.

Official Report of Examinations of Gas for three Weeks ending April 12, 1879, made at the Photometrical Room of the Department of Public Works.

Corrected Illuminating Power.

Mar 1879.	Time of Day at which Test were made.	New York Gas Light Co.	Manhattan Gas-Light Co.	Mutual Gas Light Co.	Metropolitan Gas-Light Co.	Harlem Gas-Light Co.	Municipal Gas-Light Co.
31		17.03	17.14	18.78	17.03	16.73	
Apl. 1	Between	17.09	17.30	18.78	16.93	16.85	
2	9.30 A.M.	16.52	16.80	18.48	16.70	17.03	
3	and	16.34	16.95	18.69	16.92	16.94	
4	1 P.M.	16.13	16.50	19.14	17.19	16.99	
5		16.74	16.54	19.27	17.04	16.89	
	Average	16.64	16.87	18.85	16.97	16.90	
7		17.11	17.41	19.78	17.06	16.70	
8		17.09	17.20	19.62	17.13	16.47	
9		16.54	17.11	18.63	16.84	16.42	
10		16.60	16.74	18.85	16.59	16.13	
11		16.58	16.19	18.38	16.52	16.20	
12		16.67	16.46	20.48	16.34	15.92	
	Average	16.76	16.85	19.29	16.74	16.30	

Sugg-Letheby burner.

E. G. LOVE, Gas Examiner

Reduction in Price of Gas at St. Paul, Minn.—The price of gas, from April 1, is $4 per thousand, with the following discounts:—$20 or less, 15 per cent.; from $20 to $100, 20 per cent.; and from $100 to $200, 25 per cent. Provided always the bills are paid by the 10th of the ensuing month. No deductions made after the 10th.

The Colorado Coke Trade.

Seventy ovens for the manufacture of coke are in operation at the coal banks near Trinidad and El Moro. Thirty more will be completed by the first of May. This is but the nucleus of what promises to be an extensive business. Our latest advices from that quarter are highly encouraging. One company is turning out fifteen thousand tons of coke per month, and the principal markets for it are Denver, Golden and Pueblo. Every pound is consumed within the State. A year ago considerable shipments were made to Utah, but were discontinued owing to the large percentage of ash or gross matter in them. Fortunately, by continual experimenting, this objection has been overcome. A car-load of the coal was sent to Pennsylvania to be crushed and washed previous to coking, and the trial established the complete success of this process. The coke made by this method of operation proved superior to that of Pennsylvania, and the El Moro company have since erected and employed machinery for crushing and cleansing the coal, and also brought out an experienced worker, who is now on the ground. He claims that he can make from our Southern Colorado coals, as fine coke as can be made elsewhere in America. The demand for this article of fuel must necessarily be large in the field of smelting gold and silver ores and in the iron trade. As these industries expand, the coke trade will increase in corresponding ratio, and thus establish an enduring new industry among the inexhaustible coal fields of the southern half of the State.—*Denver Times.*

Naphthaline in Coal Gas.

The methods for removing naphthaline deposits, when formed, are well known, and tolerably efficient for their purpose. The earliest and simplest method of this kind is to "plunge" the pipes, forcibly knocking out the crystalline deposits. Secondly, there is the washing out of the deposits by water, sometimes used hot and sometimes cold. Thirdly, there is driving steam into the pipes.

A drawback upon both the washing and steaming processes is, that the crystallized naphthaline is seldom wholly removed, but fuses into solid masses very difficult of removal; and if any portion of the naphthaline remain in the pipes, it serves as a nucleus of fresh crystallization, which sometimes takes place very rapidly. Mr. G. Anderson has pointed out an objection to the use of steam—namely, that it so thoroughly cleanses the surface of the pipes from oily or tarry matter, that the surface is as rough as when the pipes where first laid, whereas a smooth or lubricated surface is favorable for the prevention of naphthaline deposits. "With reference to steaming the mains being useless," Mr. Anderson says, "on one occasion I had a main-pipe which gave me some trouble, and which was steamed with water almost every month. It occurred to me that this operation itself might be the cause of the deposit of so much naphthaline, as, on examining the pipe, I found it as clean as when it left the mould. I accordingly employed the vapor of naphtha, using for this purpose the little tank of one of Walker's portable boilers. The vapor entered the tank very readily, and was pumped out and used over and over again. I have not had to steam the main since."

Mr. G. Livesey gives the following instance of the effect of lubricating the surface of pipes: He had a small pipe which passed outside a wall to supply gas to heat a greenhouse. Every night in winter he had to wash out that pipe by filling it with hot water. At last he adopted this experiment: After he had nearly filled up the pipe with hot water to dissolve the naphthaline, he poured in a little sweet oil; the water was then let out, and the sweet oil coated the pipe with a thin film, and since that period there has been no deposit of naphthaline in it

Another gas manager states that he has found good results from putting a drop of naphtha oil on the top or nipples of the burners of the street lamps when they became choked with naphthaline.

In lieu of mere plunging, or of the employment of water or steam, the putting of naphtha vapor into the pipes is by some regarded as a more efficient process; or the same object is attained by substantially the same means—viz., by temporarily enriching the gas by using more cannel in the retorts. Indeed, in large gas works like those of London, when complaints of stoppages become numerous, the remedy usually adopted is to use more cannel, and "flush out" the naphthaline by a temporary flood of rich gas liquefies or licks up the naphthaline and re-opens the pipes generally.

Having thus reviewed the great variety of external circumstances under which deposits of naphthaline occur, the physical causes which promote and extend these deposits, and also the best methods of removing them when formed, the question remains, Can anything, or what, be done to prevent these obstructions altogether? Can we apply a remedy at the root of the evil, by so treating the gas itself as to leave in it none of the readily condensable substance which occasions these troublesome deposits?

The question as it now presents itself is two-fold: (1) Take out the whole of the naphthaline from the gas on the works, by processes in connection with the purification. And what are the best processes for this purpose? (2) Can we convert the naphthaline, or at least such portion of it as ordinarily remains in the gas, into a non-condensing element of the gas; and if so, by what process or apparatus can this be best effected? And along with these questions comes a third—namely, considering the possibilities of the matter, which of these two antagonistic objects is the one which ought to be preferred, and kept in sight with a view to its practical realization? One or other of these two objects must be wrong—they are totally antagonistic and incompatible, yet it is absolutely indispensable to further progress to determine which of them is right—whether the object of gas managers should be to take out all the naphtha ine from the gas, or endeavor to keep it in.

Naphthaline exists in all crude gas; and the naphthaline difficulty, in its simplest form—viz., the choking of pipes by substances condensed out of the gas—is as old as gas manufacture itself. At first, indeed until a comparatively recent date, almost the sole thought or object of gas managers was naturally, merely how to get rid of these obstructions when formed—how best to clear out the choked pipes. About ten years ago, when gas managers began to compare notes with one another by means of their invaluable Associations, the farther and more important question came to be discussed as to how far and by what means the formation of these obstructions could be prevented. And the first idea, and a very natural one, was that the remedy must be found by removing the naphthaline from the gas in the process of purification. The tar deposited from the gas in the process of condensation is well known to have a great power of absorbing naphthaline (withdrawing it from the gas on the principle of chemical affinity); but the first procedure of this kind originated prior to and irrespective of any chemical teachings or abstract knowledge, a full lifetime ago, and simply as the result of the experience and observation of a foreman. In the first important discussion upon naphthaline in 1868, Mr. G. Livesey stated that so long ago as when his father first went to the South Metropolitan Gas Works, the then foreman of their works, a Mr. Thompson, used constantly to "advocate the system of allowing the tar to flow with the gas as far as possible—in fact until the gas was thoroughly condensed," as a means of preventing or diminishing the deposit of naphthaline in the pipes. Various and conflicting as are the prescriptions since then and still made on this subject, any one who reads the discussions will see that this old maxim of Thompson's not only holds its place, but is the most prevalent one at the present time. In

1868, as still, the doctrine as usually stated is "to cool the gas in contact with the tar and the ammoniacal liquor." It seems to us that the presence of the ammoniacal liquor is of no use at all for this particular purpose, and that the absorption of the naphthaline out of the gas by means of the tar (supposing such process to be desirable) would certainly be better accomplished by withdrawing the condensed water so as to leave the gas more directly in contact with the tar.—*Gas Trade Circular and Review.*

A New Method of Working Coal Mines.—At the ordinary monthly meeting of the Manchester Geological Society, on the 25th ult., a paper was read by Mr. W. E. Garforth, on "The advantages of compressed air at high pressures (8,000 lbs. and upwards per square inch) as compared with blasting by means of gunpowder or other explosives." In the course of his remarks Mr. Garforth observed that Messrs. Garforth, of Dukinfield, had constructed a machine for bursting down coal instead of blasting it with gunpowder, by which 14,200 lbs. pressure per square inch of compressed air had been obtained. The machine was a portable one; it could be worked by two men, and its dimensions made it suitable for small mines. Trials had been made with the machine for some time past, and on the 24th ult. experiments were conducted at the Bower Colliery, Hollinwood. The machine on that occasion, working at a pressure of 9,550 lbs. to the square inch, broke down from five to six tons of very hard coal. Part of the invention related to a drilling-machine, patented by Mr. Ernest Reuss of Manchester. The merit of Mr. Garforth's machine is, however, claimed by Mr. Samuel Marsh, by virtue of a patent obtained by him in 1876.—*The Builder.*

Fraudulent Consumption of Gas—At the Bury Police Court on Jan. 23, John Ward, landlord of the Church Inn, Spring street, Bury, was summoned by the Gas Corporation for a breach of the Gas Works Clauses Act. From the evidence it appeared that on the 26th of December the defendant admitted to one of the company's inspectors that he had connected a pipe with the main; and upon the matter being reported to the gas committee, the gas manager found on going to the premises of the defendant that he had coupled an india rubber pipe with the inlet pipe, and removed the meter. The defence was that Ward connected the pipe in order to improve the lighting of his house, the gas being very bad, and that he had no intention to defraud. Defendant was fined 20s. and costs, which he objected to pay, and was told that if he did not pay a distress would be levied on his goods.—*Gas Manager and Sanitary Engineer.*

OUR EXCHANGES.

United States.

[*Engineering News.*]

The price of gas in Vicksburg, Miss., has been reduced from $4.50 to $4 per thousand feet.

The board of councilmen of the city of South Norwalk have voted to dispense with gas and use oil for lighting the street lamps.

The Montreal gas company have made a reduction of 50 cents per thousand feet, and now charge at the rate of $2 per thousand feet.

The gas pouring from the Le Roy, New York, salt well is stated to be highly sulphuric, with perhaps a very slight petroleum odor, and different in all respects from that ordinarily found in the oil regions.

The Philadelphia *Press* thinks "the electric light is anything but a failure. It is reported that Mr. Edison has eighteen lamps working perfectly in his shop, and is preparing to give his system a practical test in the town of Metuchen, near Menlo Park. Another decline in gas stocks may be looked for in the near future." *Perhaps!*

Prices of Gas Coal.

Penn and Westmoreland	$4.50 at New York.
" "	3.50 at Baltimore.
" "	3.75 at Philadelphia.
Despard, Newburgh Orrel, Murphy Run	4.25 at New York. 3.50 at Baltimore.
Chesapeake & Ohio	4.50 at New York.
" "	
Newcastle	3.25 to 3.50
Provincial	3.50 to 3.75
Cannelton Cannel	8.50 at New York.
Ince Hall	7.25

The above prices are about $1 per ton below those of 1878.

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
(with W B Scott & Co.,)
24 PINE STREET, NEW YORK CITY.
APRIL 16, 1879.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

	Capital.	*Par.*	*Bid.*	*Asked.*
Gas Co.'s of N. Y. City.				
Central	466,000	50	60	75
Harlem	1,800,000	50	40	50
" Bonds	170,000			103
Manhattan	4,000,000	50	188	195
Metropolitan	2,500,000	100	120	125
" Scrip	$1,000,000	..	99	103
Mutual	5,000,000	100	70	75
" Bonds, gold	900,000	1000	95	99
Municipal	1,500,000	100	110	117
" Bonds	750,000		95	100
New York	4,000,000	100	95	98
Nothern	270,000	50	—	100
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	140	145
Citizens	1,200,000	20	67	75
" Scrip	320,000	1000	90	95
Peoples	1,000,000	10	—	10
" Bonds	325,000	...	--	95
" Scrip	300,000	...	75	80
Metropolitan	1,000,000	100	60	65
Nassau	1,000,000	25	70	75
" Ctfs.	700,000	1000	90	95
Williamsburgh	1,000,000	50	85	90
" Scrip		...	90	95
Kings Co	200,000	100	—	70
Union Co. E N. Y.		25	—	50
Richmond Co., S. I.	300,000	...	60	85
Out of Town Gas Companies.				
Bath, Maine	70,000	100		
Buffalo Mutual, N.Y	750,000	100	65	70
" Bonds	200,000	1000	95	100
Baltimore, Md	2,000,000	100	95	98
" Ctfs., gold	1,000,000		95	10
Bayonne, N. J		100		90
Brockport, N. Y	25,000	100	...	80
Citizens, Newark	918,000	50	90	95
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			128	130
Cincinnati G. & C. Co.				190
Derby of Conn	160,000	100	60	80
East Boston, Mass		25	114	120
Elizabethtown, N. J.	300,000	20	—	130
Fort Wayne, Ind.		100	...	—
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	120	125
Hempstead, L. I.	25,000	100	...	—
Jersey City	386,000	20	140	145
Jamaica, L. I.	25,000	100	...	—
Jacksonville, Ill	120,000	50	100	...
Lewistown Maine	400,000	100	70	80
Lima, Ohio, Bonds	60,000 30,000	100	— 90	...
Laclede St Louis Mo.	1,200,000	100	—	75
Long Branch		20	30	40
New Haven, Conn		25	136	152
Peoples, Jersey City		...	—	80
" " Bds.				95
Peoples of Albany	650,000	100	—	10
" Bonds	350,000	1000	—	-
Peoples of Baltimore		25	44	48
" Bonds			106	—
Plainfield, N. J	80,000	100	—	105
Perth Amboy		25	—	95
Rochester, N. Y		100	70	80
" Citizens		100	50	60
Toledo, Ohio			95	97
Washington, D. C	1,500,000	20	190	200
" Scrip	500,000	20	100	—
Yonkers		50	70	80
Woonsocket, R. I.	150,000	100	80	...
Halifax N. S.	400,000	40	148	150
Hamilton, Ontario	150,000	40	117½	
Pittsfield, Mass			120	130
Rondout & Kingston			75	80
St. Louis, Missouri	600,000	50	73	75
Stillwater, Minn	50,000	50	—	26
Saugerties, N. Y	15,000	100	95	100
Troy, Citizens	600,000	100	—	60
San Francisco Gas-Co., S. Fr'isco Cal.			95	95¼

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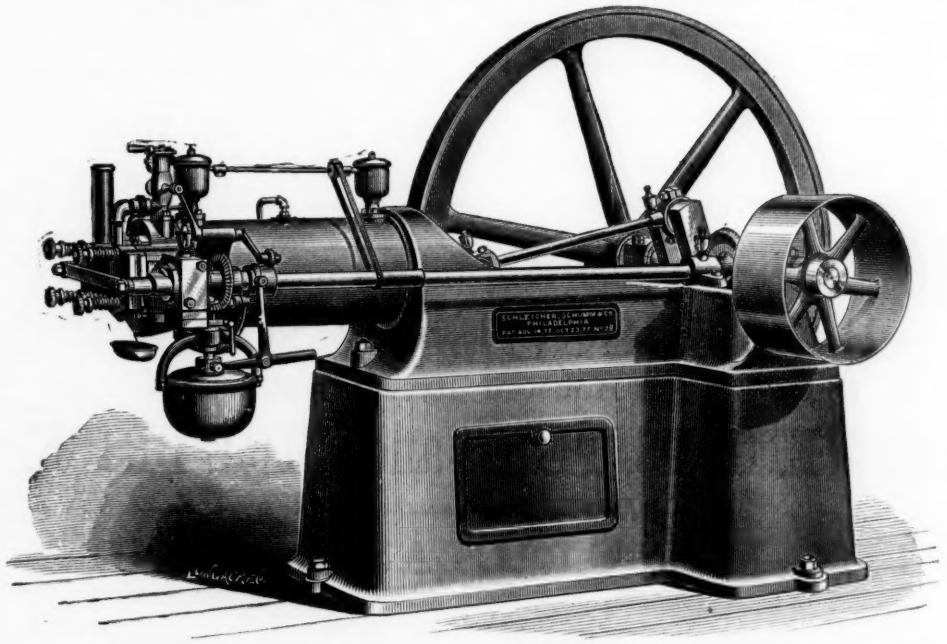

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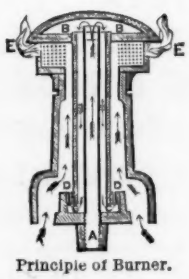

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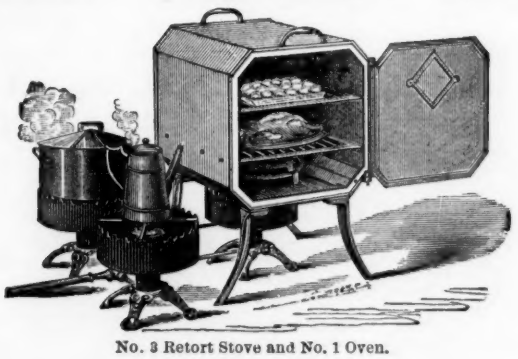

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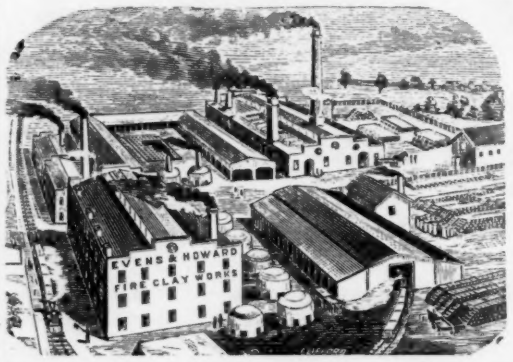

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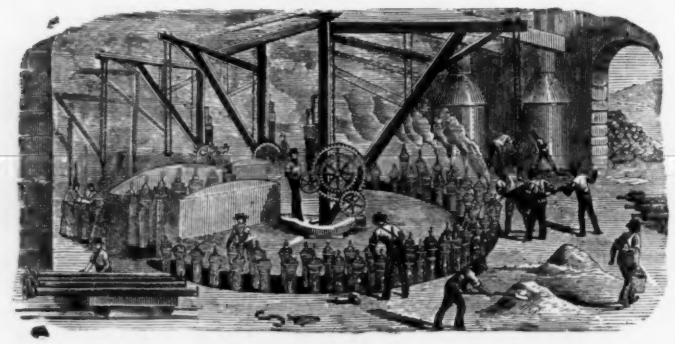

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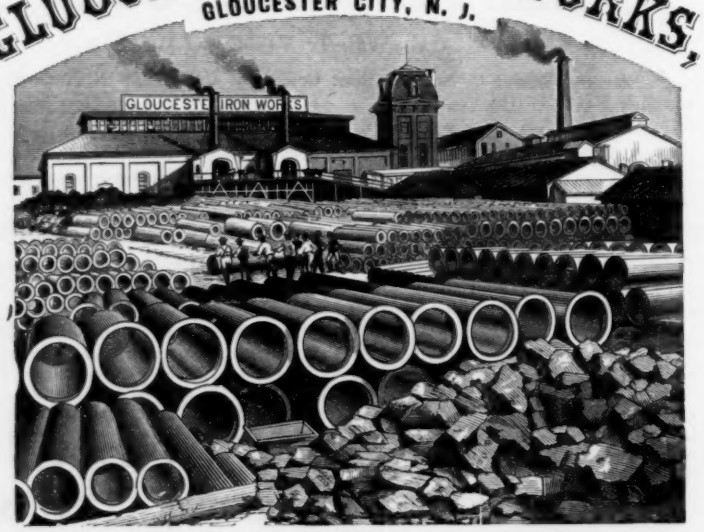

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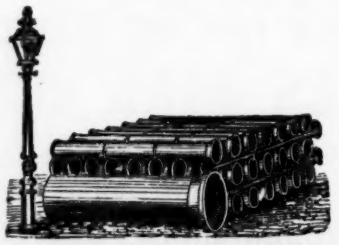

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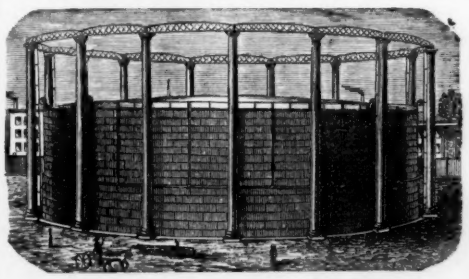

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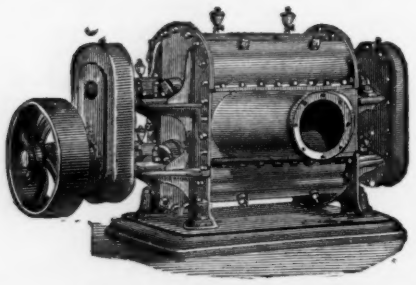

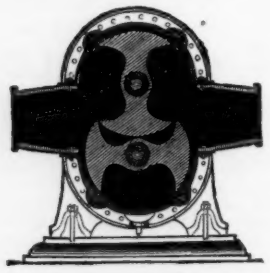

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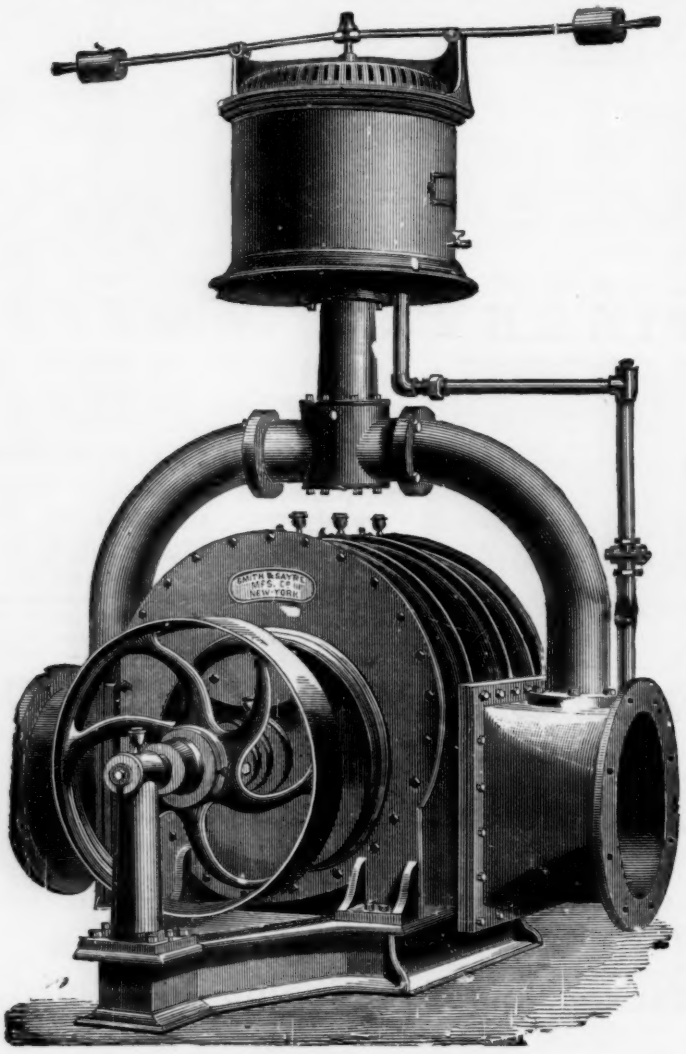

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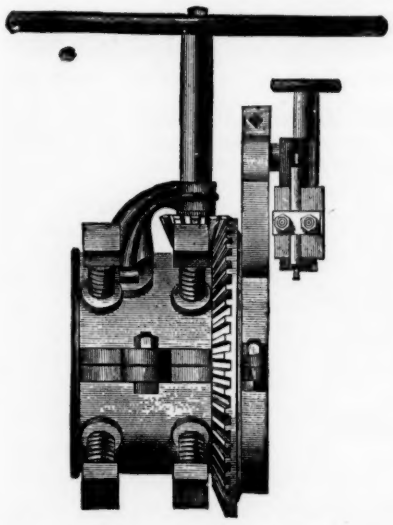

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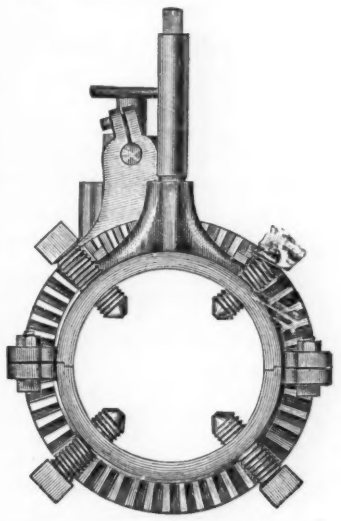

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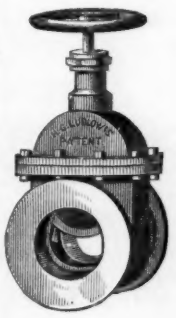

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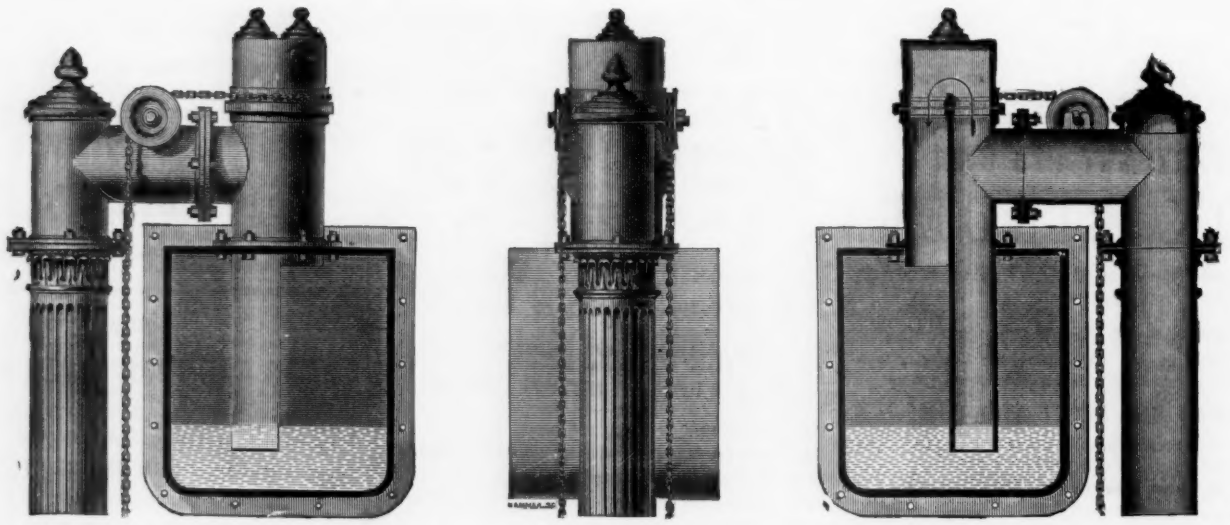

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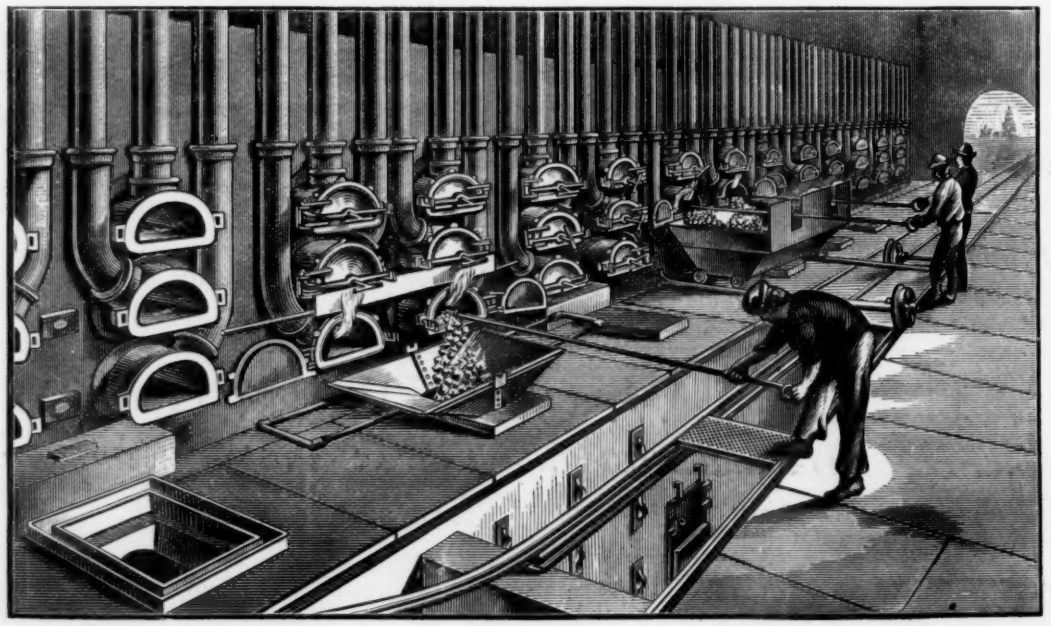

These Furnaces have been in operation at the works of the People's Gas Company, Baltimore, since June, 1878, and all the benches in use at the present time at the above works are heated by this system, **WHICH EFFECTS A SAVING OF 33 PER CENT. IN THE NUMBER OF RETORTS REQUIRED** for making a given quantity of gas per day.

A charge which ordinarily requires four hours **IS THOROUGHLY BURNED OFF IN THREE HOURS**, and the amount of coke used does not exceed **33** per cent. of coke made.

The patentee is now prepared to furnish plans, detailed drawings, and full directions for construction to those desiring to purchase. For full particulars apply to either

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